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PANASONIC CT-27D31CE SERVICE MANUAL

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ORDER NO. MTNC010201A1
B5

Service Manual

Simplified

Color Television

Simplified Manual (NA8)

Panasonic

Models	Chassis
CT-27D11E	**JP338**
CT-27D11DE	**JP338**
CT-27D11UE	**JP338**
CT-27D21E	**KP338**
CT-27D21UE	**KP338**
CT-27D31E	**RP338**
CT-27D31CE	**RP338**
CT-27D31UE	**RP338**
CT-2772SE	**KP338**
CT-2772SCE	**KP338**
CT-2772SUE	**KP338**

This Simplified Service Manual is issued to add listed models to the Main Service Manual order No. **MTNC000417C1 (CT-27D10B).** A full set of schematics and a complete parts list are included in this Simplified Manual**.**
Please file and use this Simplified Service Manual together with Main Service Manual, order No. **MTNC000417C1.**

"**WARNING!** This Service Manual is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product. **Products powered by electricity should be serviced or repaired only by experienced professional technicians.** Any attempt to service or repair the product or products dealt with in this Service Manual by anyone else could result in serious injury or death."

The service technician is required to read and follow the "**Safety Precautions**" and "**Important Safety Notice**" in this Manual.

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Important Safety Notice

Special components are used in this television set which are important for safety. These parts are identified on the schematic diagram by the symbol ⚠ and printed in **BOLD TYPE** on the replacement part list. It is essential that these critical parts are replaced with the manufacturer's specified replacement part to prevent X-ray radiation, shock, fire or other hazards. Do not modify the original design without the manufacturer's permission.

Safety Precautions

General Guidelines

An **Isolation Transformer** should always be used during the servicing of a receiver whose chassis is not isolated from AC power line. Use a transformer of adequate power rating as this protects the technician from accidents resulting in personal injury from electrical shocks. It will also protect the Receiver from being damaged by accidental shorting that may occur during servicing.

When servicing, observe the original lead dress, especially in the high voltage circuit. Replace all damaged parts (also parts that show signs of overheating.)

Always Replace Protective Devices, such as fishpaper, isolation resistors and capacitors, and shields after servicing the Receiver. Use only manufacturer's recommended rating for fuses, circuits breakers, etc.

High potentials are present when this Receiver is operating. Operation of the Receiver without the rear cover introduces danger for electrical shock. Servicing should not be performed by anyone who is not thoroughly familiar with the necessary precautions when servicing high-voltage equipment.

Extreme care should be practiced when **Handling the Picture Tube**. Rough handling may cause it to implode due to atmospheric pressure. (14.7 lbs per sq. in.). Do not nick or scratch the glass or subject it to any undue pressure. When handling, use safety goggles and heavy gloves for protection. **Discharge the picture tube** by shorting the anode to chassis ground (not to the cabinet or to other mounting hardware). When discharging connect cold ground (i.e. dag ground lead) to the anode with a well insulated wire or use a grounding probe.

Avoid prolonged exposure at close range to unshielded areas of the picture tube to prevent exposure to X-ray radiation.

The **Test Picture Tube** used for servicing the chassis at the bench should incorporate safety glass and magnetic shielding. The safety glass provide shielding for the tube viewing area against X-ray radiation as well as implosion. The magnetic shield limits the X-ray radiation around the bell of the picture tube in addition to the restricting magnetic effects. When using a picture tube test jig for service, ensure that the jig is capable of handling **50kV** without causing X-ray radiation.

Before returning a serviced receiver to the owner, the service technician must thoroughly test the unit to ensure that is completely safe to operate. **Do not use a line isolation transformer when testing.**

Leakage Current Cold Check

Unplug the AC cord and connect a jumper between the two plug prongs.

Measure the resistance between the jumpered AC plug and expose metallic parts such as screwheads, antenna terminals, control shafts, etc. If the exposed metallic part has a return path to the chassis, the reading should be between 240kΩ and 5.2MΩ. If the exposed metallic part does not have a return path to the chassis, the reading should be infinite.

Leakage Current Hot Check (Fig. 1)

Plug the AC cord directly into the AC outlet. Do not use an isolation transformer during the check.

Connect a 1.5kΩ 10 watt resistor in parallel with a 0.15μF capacitor between an exposed metallic part and ground. Use earth ground, for example a water pipe.

Using a DVM with a 1000 ohms/volt sensitivity or higher, measure the AC potential across the resistor.

Repeat the procedure and measure the voltage present with all other exposed metallic parts.

Verify that any potential does not exceed 0.75 volt RMS. A leakage current tester (such a Simpson Model 229, Sencore Model PR57 or equivalent) may be used in the above procedure, in which case any current measure must not exceed 0.5 milliamp. If any measurement is out of the specified limits, there is a possibility of a shock hazard and the Receiver must be repaired and rechecked before it is returned to the customer.

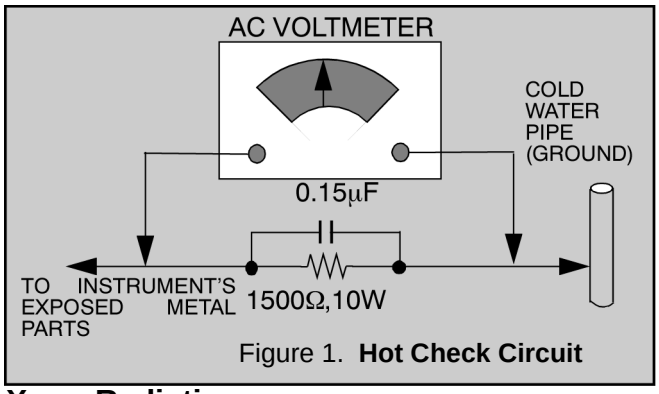

Figure 1. **Hot Check Circuit**

X-ray Radiation

WARNING: The potential source of X-ray radiation in the TV set is in the High Voltage section and the picture tube.

Note: *It is important to use an accurate, calibrated high voltage meter.*

Set the **brightness, picture, sharpness** and **color** controls to Minimum. Measure the High Voltage. The high voltage should be **28.30kV ± 1.25kV**. If the upper limit is out of tolerance, immediate service and correction is required to insure safe operation and to prevent the possibility of premature component failure.

Horizontal Oscillator Disable Circuit Test

This test must be performed as a final check before the Receiver is returned to the customer. See Horizontal Oscillator Disable Circuit Procedure Check in this manual.

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Service Notes

Note: These components are affixed with glue. Be careful not to break or damage any foil under the component or at the pins of the ICs when removing. Usually applying heat to the component for a short time while twisting with tweezers will break the component loose.

Leadless Chip Component (surface mount)

Chip components must be replaced with identical chips due to critical foil track spacing. There are no holes in the board to mount standard transistors or diodes. Some chips capacitor or resistor board solder pads may have holes through the board, however the hole diameter limits standard resistor replacement to 1/8 watt. Standard capacitor may also be limited for the same reason. It is recommended that identical components be used.

Chip resistor have a three digit numerical resistance code - 1st and 2nd significant digits and a multiplier. Example: 162 = 1600 or 1.6kΩ resistor, 0 = 0Ω (jumper).

Chip capacitors generally do not have the value indicated on the capacitor. The color of the component indicates the general range of the capacitance.

Chip transistors are identified by a two letter code. The first letter indicates the type and the second letter, the grade of transistor.

Chip diodes have a two letter identification code as per the code chart and are a dual diode pack with either common anode or common cathode. Check the parts list for correct diode number.

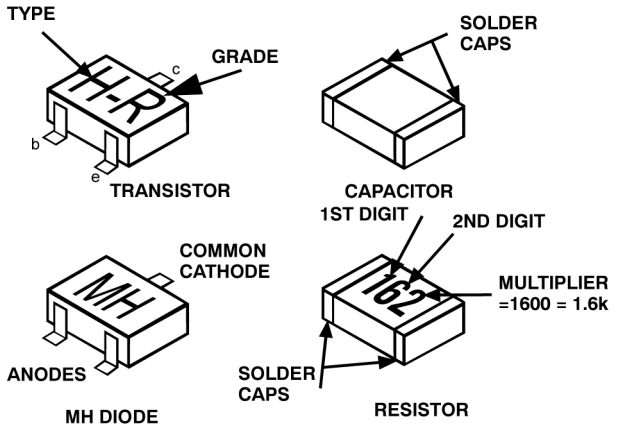
Component Removal

1. Use solder wick to remove solder from component end caps or terminal.
2. Without pulling up, carefully twist the component with tweezers to break the adhesive.
3. Do not reuse removed leadless or chip components since they are subject to stress fracture during removal.

Chip Component Installation

1. Put a small amount of solder on the board soldering pads.
2. Hold the chip component against the soldering pads with tweezers or with a miniature alligator clip and apply heat to the pad area with a 30 watt iron until solder flows. Do not apply heat for more than 3 seconds.

Chip Components

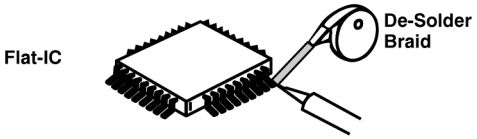


How to Replace Flat-IC

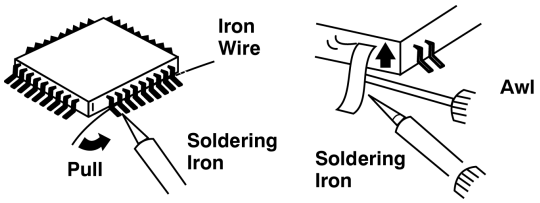
- Required Tools -

- Soldering iron
- De-solder braids
- Iron wire or small awl
- Magnifier

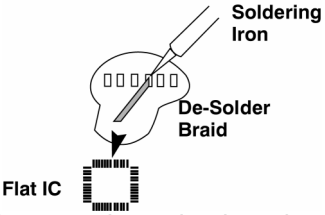
1. Remove the solder from all of the pins of a Flat-IC by using a de-solder braid.



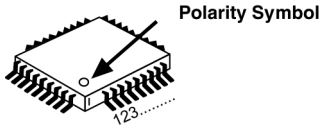
2. Put the iron wire under the pins of the Flat-IC and pull it in the direction indicated while heating the pins using a soldering iron. A small awl can be used instead of the iron wire.



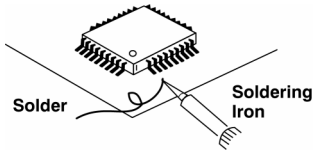
3. Remove the solder from all the pads of the Flat-IC by using a de-solder braid.



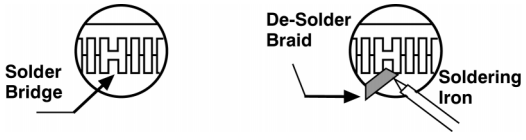
4. Position the new Flat-IC in place (apply the pins of the Flat-IC to the soldering pads where the pins need to be soldered). Properly determine the positions of the soldering pads and pins by correctly aligning the polarity symbol.



5. Solder all pins to the soldering pads using a fine tipped soldering iron.



6. Check with a magnifier for solder bridge between the pins or for dry joint between pins and soldering pads. To remove a solder bridge, use a de-solder braid as shown in the figure below.



IMPORTANT: To protect against possible damage to the solid state devices due to arcing or static discharge, make certain that all ground wires and CRT DAG wire are securely connected.

CAUTION: The power supply circuit is above earth ground and the chassis cannot be polarized. Use an isolation transformer when servicing the Receiver to avoid damage to the test equipment or to the chassis. Connect the test equipment to the proper ground (⏚) or (⏚) when servicing, or incorrect voltages will be measured.

WARNING: This Receiver has been designed to meet or exceed applicable safety and X-ray radiation protection as specified by government agencies and independent testing laboratories.

To maintain original product safety design standards relative to X-ray radiation and shock and fire hazard, parts indicated with the symbol ⚠ on the schematic must be replaced with identical parts. Order parts from the manufacturer's parts center using the parts numbers shown in this service manual, or provide the chassis number and the part reference number.

For optimum performance and reliability, all other parts should be replaced with components of identical specification.

Horizontal Oscillator Disable Circuit

This chassis employs a special circuit to protect against excessive high voltage and beam current. If, for any reason, the high voltage and beam current exceed a predetermined level this protective circuit activates and detunes the horizontal oscillator that limits the high voltage. The over-voltage protection circuit is not adjustable. However, if components indicated by the symbol ⚠ on the schematic in either the horizontal sweep system or the over-voltage protection circuit itself are changed, the operation of the circuit should be checked using the following procedure:

Equipment needed to check the disabled circuit:

1. Voltmeter (0 - 200V scale)

2. High Voltage Meter (0- 50kV)

3. Variac or Isolation Transformer

Procedure:

1. Tune in a station to verify that the horizontal is in sync.

2. Obtain a Monoscope pattern or a signal generator crosshatch pattern

3. Connect the voltmeter (-) lead to TPD2 and the (+) lead to TPD1 (junction of D555 anode, R556 & R557). Set **Bright** level to (0) and **Picture** for a 1.8 volt reading on the voltmeter.

4. Turn the Receiver OFF. Connect a jumper across IC803 pin 3 and pin 4. Apply +9V DC to cathode of D001.

5. Reduce the AC supply voltage to approximately 45V. Connect the high voltage meter to the CRT anode. (H.V. button).

Note: *Use the Dag Ground (C10 on the CRT Board) to connect the (-) lead of the meter.*

6. Turn the Receiver ON. Slowly increase the AC supply voltage and verify that the high voltages does not exceed **37.1kV** when horizontal; just begins to pull out of sync. If the high voltage is not within the specified limit, the cause must be determined and corrected before the Receiver is returned to the customer.

7. Remove jumper installed in Step 4.

Receiver Feature Table

FEATURE\MODEL	CT-27D11E/DE/UE	CT-27D21E/UE	CT-27D31E/CE/UE	CT-2772SE/CE/UE
Chassis	J338	K338	R338	K338
Tuning system	96K	96K	96K	96K
# of channels	181	181	181	181
Menu language	Eng/Span/Fr	Eng/Span/Fr	Eng/Span/Fr	Eng/Span/Fr
Closed Caption	X	X	X	X
V-Chip	X	X	X	X
PIP	- -	1T	2T	1T
75 Ω input	X	X	X	X
Remote Model #	EUR511502	EUR511501	EUR511500	EUR511511
Picture tube	M68LGL061X	M68LGL061X	M68LGL061X	M68LGL061X
Comb Filter	3 Line Digital	3 Line Digital	3 Line Digital	3 Line Digital
H. Edge Correction	X	X	X	X
V/A norm	X	X	X	X
Color Temp	X	X	X	X
MTS/SAP/DBX	X	X	X	X
BASS/BL/TRE Control	X	X	X	X
AI Sound	X	X	X	X
Surround	X	X	X	X
Built-in audio power	5Wx2 (10%)	5Wx2 (10%)	5Wx2 (10%)	5Wx2 (10%)
# of speakers	2	2	2	2
A/V in (rear/front)	3(2/1)	3(2/1)	3(2/1)	3(2/1)
S-VHS Input (rear/front)	1/0	1/0	1/0	1/0
Component Input (Y,Pb,Pr)	1	1	1	1
FAO/ VAO	X	X	X	X
Headphone Jack	Mini plug	Mini plug	Mini plug	Mini plug
Dimensions mm (WxDxH) in	665.2x544.5x594.8 26.2x21.5x23.5	665.2x544.5x594.8 26.2x21.5x23.5	665.2x544.5x594.8 26.2x21.5x23.5	665.2x544.5x594.8 26.2x21.5x23.5
Weight (kg/lbs)	35/77.2	35/77.2	35/77.2	35/77.2
Power source (V/Hz)	120/60	120/60	120/60	120/60
Anode voltage	28.30kV ± 1.25kV	28.30kV ± 1.25kV	28.30kV ± 1.25kV	28.30kV ± 1.25kV
Video input jack	$1V_{p-p}$ 75Ω, phono jack	$1V_{p-p}$ 75Ω, phono jack	$1V_{p-p}$ 75Ω, phono jack	$1V_{p-p}$ 75Ω, phono jack
Audio input jack	500mV RMS 47kΩ	500mV RMS 47kΩ	500mV RMS 47kΩ	500mV RMS 47kΩ
A-Board TNP2AH017	AF	AG	AH	AG
C-Board TNP2AA047	AX	AX	AX	AX
Y-Board TNPA1059	- -	BD	BD	BD
S-Board TNPA0190	- -	- -	AL	- -

Table 1: **Receiver Features**

Specifications are subject to change without notice or obligation.
Dimensions and weights are approximate.

Disassembly for Service

Back Cover

Remove all the screws marked with an arrow(◄) from the back of the Receiver.

Note: *Screw configuration, type, and number of screws vary depending on the model of the Receiver serviced and the application; various models are covered in this Manual. Use same hardware when reassembling the receiver.*

- 3 screws at the top edge of the Receiver.
- 1 screw at each lower corner of the Receiver.
- 1 screw by the AC cord assembly.
- 1 screw by the A/V jacks.
- 1 screw by the Flyback assembly.

A-Board - Main Chassis

1. Slide the chassis completely out of the guide rails.
2. Stand the Receiver on its edge. The underside of the board is completely accessible for component replacement.

Note: *Some tie-wraps that secure the wire dressings may need to be unfastened for chassis removal.*

C-Board - CRT Output

Plugs into the socket on the CRT neck.

Y-Board - PIP Processing

(CT-27D21E/UE, CT-2772SE/SCE/SUE & CT-27D31E/CE/UE)

Plugs into the A-Board and held by two connectors. To remove, press on the tab of each connector and carefully pull up.

S-Board - Second Tuner (CT-27D31E/CE/UE)

Slides into left side of chassis next to the A-Board. Remove the connector from the A-Board.

Speakers

Each speaker is secured to the cabinet's front with 4 screws.

Keyboard Push Button Assembly

Fastened with screws to the inside of the cabinet front.

Disassembly for CRT Replacement

1. Discharge the CRT as instructed in the **Safety Precautions** (see page 2).
2. Disconnect the yoke (DY) plug, degaussing coil (DEG) plug and the CRT 2nd anode button from the main board.
3. Remove the C-Board from the CRT base and unplug the black wire (CRT dag ground) C10.
4. Disconnect the A11, A12, and Speakers plugs from the A-Board.
5. Lift the Main Chassis (A-Board) and all mounted boards completely out with the CRT Board attached.

CRT Replacement

1. Perform **Disassembly for CRT Replacement** procedure.
2. Insure that the CRT H.V. Anode button is discharged before handling the CRT. Read the **Safety Precautions** (see page 2) on handling the picture tube.
3. Remove the components from the CRT neck and place the cabinet face down on a soft pad.
4. Note the original order for the CRT mounting hardware as they are remove from the CRT mounting brackets at each corner of the CRT.
5. Remove the CRT with the degaussing coil and the dag ground braid attached.
6. Note the original locations and mounting of the degaussing coil and the dag ground assembly to insure proper reinstallation on the replacement CRT.

   To remove and re-mount the degaussing coil: The degaussing coil is held in place by clampers fastened to the CRT corner ears, indicated as location "B" in Fig. 2. These clampers must be installed onto the replacement CRT prior to mounting the degaussing coil.

   To remove and re-mount the dag ground braid:

   a. Unhook the coil spring from the bottom corner of the CRT ears.

   b. Release the braid loop from the upper corners of the CRT ears.
7. Mount the dag ground braid on the replacement CRT. Position the degaussing coil with new ties. Dress coil as and shape it to the CRT contour, and use tape to secure it, as indicated in Fig. 2. Verify that degaussing coil does not come in contact with the dag ground or spring, or blocking hole "C" in Fig. 2. Maintain a minimum of 50mm between the degaussing coil and the neck area, "A" in Fig. 2.
8. Replace the components on CRT neck and reinstall into cabinet. Verify that all ground wires and circuit board plugs get connected.

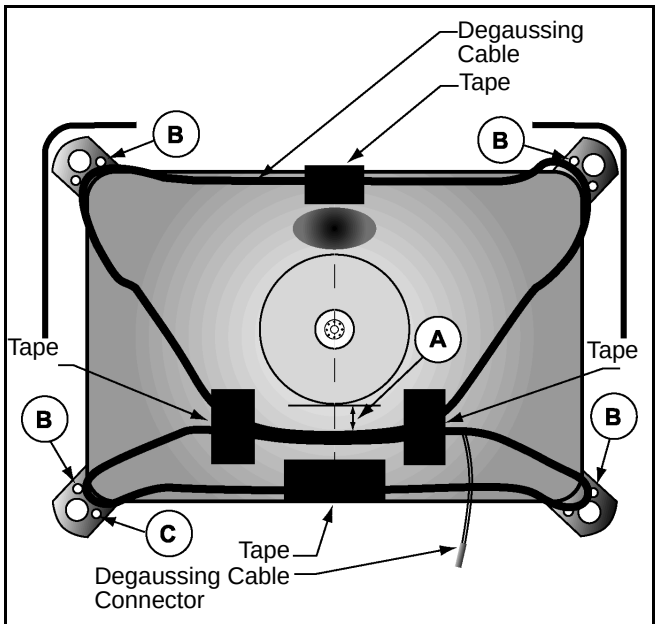


Figure 2. **Preparation of CRT**

Replacement/Adjustment of the Deflection and Convergence Yokes

The location of the convergence yoke is critical for the operation of the television. When either the deflection or the convergence yokes need to be replaced or adjusted, refer to Fig. 3 for proper positioning of the convergence yoke.

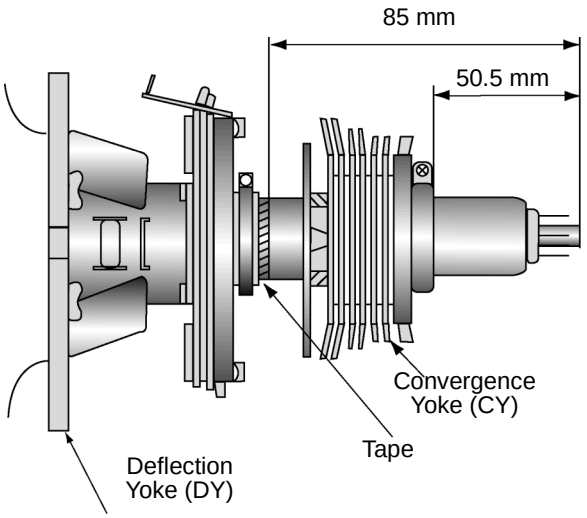


Figure 3. **Deflection & Convergence Yoke Location**

Service Adjustments (Electronic Controls)

Sub-Brightness

Serviceman DAC Adjustment (B2)

Adjustment of this control is important for setting proper operation of customer brightness and picture controls. This adjustment must be made after Sub-Contrast or Color Temperature adjustments are made. **Do not adjust** SCREEN after the Sub-Brightness is set.

Preparation:

Apply a color bar signal with 100 IRE white and 7.5 IRE black. (Switch Color to "OFF" on the signal generator.) Operate the Receiver for a minimum of 10 minutes prior to performing this adjustment.

Procedure:

In the Serviceman Mode for making electronic adjustments, select the DAC adjustment (B2) and adjust until the black starts to look gray. Then decrease the level to the point where gray turns to black.

Note: *You may set the accurate value following the Preparation steps and the Procedure step No. 2 of the Sub-Contrast adjustment described below.*

Sub-Contrast

Serviceman DAC Adjustment (B3)

This adjustment is factory set. **Do not adjust** unless repairs are made to associated circuit, the CRT Board or when the CRT is replaced.

Preparation:

1. Apply a color bar signal pattern with 87.5% modulation, 70% saturated color bar with a 100 IRE white and 7.5 black.

Note: *The pattern used in this procedure is an EIA color bar pattern with 87.5% modulation with 100 IRE white and 7.5 black. Correlate the information in this procedure to the pattern used if another signal is used.*

2. Preset the following controls:
   - Picture . . . . . Max.
   - Brightness . . . . . Center.
   - Sharpness . . . . . Center.
   - Color . . . . . Min.
   - RGB Gamma Register . . . . . Off (S3=0)
3. Connect the oscilloscope to TP47R. Set the scope time base to 20µs (horizontal).
4. Connect a jumper from TPD2 to ground (⏚).

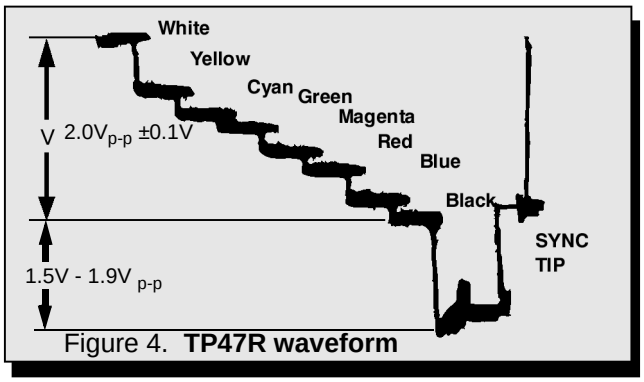


Figure 4. **TP47R waveform**

Procedure:

1. In the Serviceman Mode, select DAC Sub-Brightness Adjustment (B2) and adjust for **1.5-1.9Vp-p** between blanking and 7.5 IRE level. (See video waveforms detail, Fig. 4)
2. In the Serviceman Mode for electronic adjustments, select DAC Sub-Contrast Adjustment (B3) and adjust for **2.0Vp-p ±0.1V** white level to black level on video waveform (see video waveforms detail, Fig. 4).
3. Set the signal generator color switch to "OFF". (This will provide black & white signal only).
4. Repeat steps 1 and 2 above and observe the waveform as seen in Fig. 5.

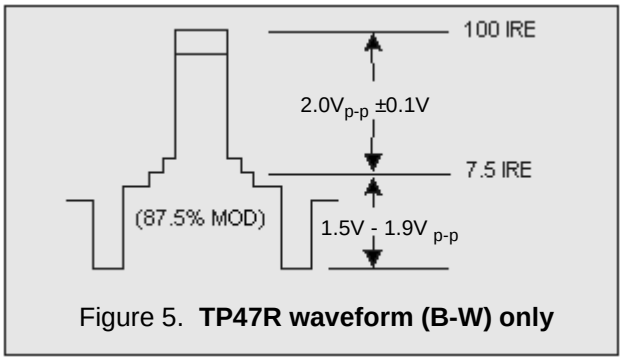


Figure 5. **TP47R waveform (B-W) only**

5. Remove the jumper (Preparation step 4). Set the RGB Gamma register to “ON” (S3=1).

Tint/Color Adjustment

Serviceman DAC Adjustment (B1) (B0)

Preparation:

1. Apply a rainbow color bar signal.
2. Preset the following controls:
   - Picture . . . . . Max.
   - Brightness . . . . . Min.
   - Sharpness . . . . . Min.
   - Color. . . . . Center.
   - Tint . . . . . Center
   - RGB Gamma Register . . . . . Off (S3=0)
3. Connect the oscilloscope to TP47B (A-Board) or C1-3 on (C-Board).
4. Connect a jumper from TPD2 to ground (⏚).

Procedure:

1. In the Serviceman Mode for making electronic adjustments, select DAC Sub-Tint Adjustment (B1). Adjust until the waveform measured is as the one shown in Fig. 6.

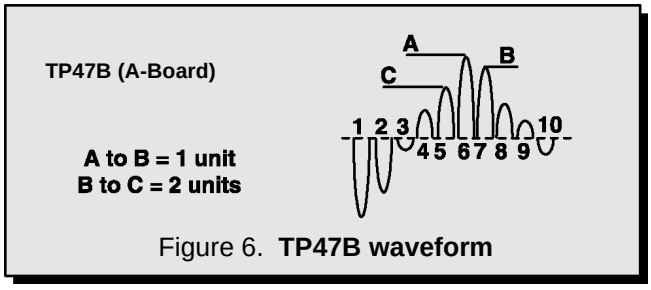


Figure 6. **TP47B waveform**

2. Connect the oscilloscope to TP47G (A-Board) or TP35.
3. Select DAC Sub-Color Adjustment (B0) and adjust for peak to peak amplitude to be **0.65Vp-p ±0.05V** as shown in Fig. 7.

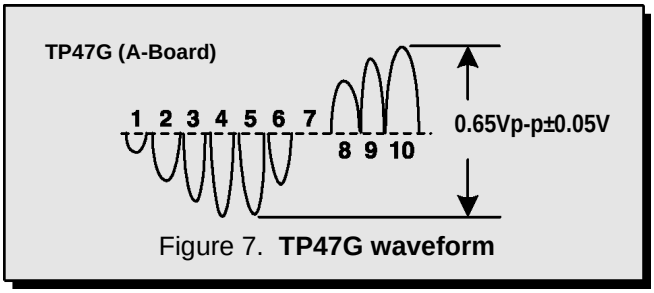


Figure 7. **TP47G waveform**

4. Remove the jumper (Preparation step 4). Set the RGB Gamma register to “ON” (S3=1).
5. Confirm the phase can be changed about ±30° by the tint control. (Tint ratio A to B=1, A to C=2).

Color Temperature Adjustment (B/W Tracking)

Serviceman DAC Adjust. (C0) (C1) (C2) (C4) (C5) Minor Touch-Up Method

OBSERVE low and high brightness areas of a B/W picture for proper tracking. Adjust only as required for “good gray scale and warm highlights”.

1. LOW LIGHT areas – In Serviceman Mode for making electronic adjustments, select Cutoff (C0) RED, (C1) GRN, (C2) BLU and adjust the picture for gray.
2. HIGH LIGHT areas – In Serviceman Mode for making electronic adjustments, select Drive (C4) GRN, (C5) BLU and adjust the picture for warm whites.

Complete Adjustment

Preparation:

1. Turn the Receiver “ON” and allow 10 minutes warm up at high brightness.
2. Apply a color bar signal with color “OFF”.
3. Turn the SCREEN control (part of FBT T551) fully counterclockwise.

Procedure:

Preset the following Serviceman DACs for best results:

- C0 128
- C1 128
- C2 128
- C4 64
- C5 64

1. Connect the oscilloscope to TP36 (CRT-Board).
2. In Serviceman Mode for making electronic adjustment, select the Sub-Bright DAC (B2).
3. Press the R-Tune key on the remote.
4. Observe the oscilloscope waveform at Horizontal rate and adjust the Serviceman Mode Sub-Bright DAC (B2) level until a scanning period of **2.5V** above DC ground is measured, as indicated in Fig. 8.

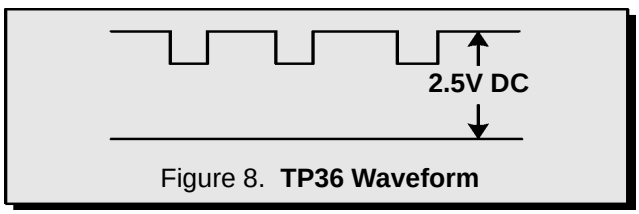


Figure 8. **TP36 Waveform**

5. Connect the scope to RED Cathode (RK) on the CRT-Board.
6. In the Serviceman Mode for making electronic adjustments, select the RED CUTOFF DAC (C0).
7. Press the R-Tune key on the remote.

8. View scope trace at Horizontal rate and adjust the Serviceman Mode DAC (C0) level until a scanning period of **195V** above DC ground is measured, as indicated in Fig. 9.
9. Connect the scope to the GRN Cathode (GK).
10. In Serviceman Mode for making electronic adjustments, select the GRN CUTOFF DAC (C1).
11. Press the R-Tune key on the Remote

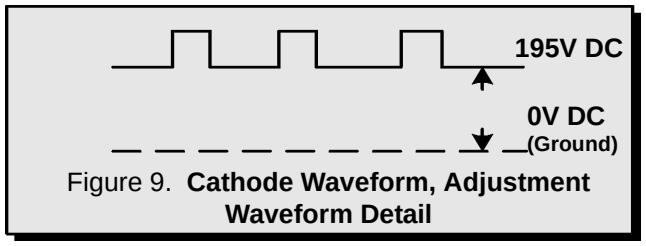


Figure 9. **Cathode Waveform, Adjustment Waveform Detail**

12. View the scope trace and adjust the Serviceman Mode DAC (C1) for the scanning period to be **195V** above DC ground. (See Fig. 9)
13. Connect the scope to the BLU Cathode (BK).
14. In Serviceman Mode for making electronic adjustments, select the BLU CUTOFF (C2).
15. Press the R-Tune key on the Remote.
16. View the scope trace and adjust the Serviceman Mode DAC (C2) for the scanning period to be **195V** above DC ground. (See Fig. 9)
17. Turn the Screen Control (part of FBT) slowly clockwise until a color horizontal line appears.
18. With the other two colors Serviceman Mode DAC CUTOFF adjustments (C0) RED, (C2) BLU; increase the colors to create a white horizontal line.
19. Confirm that a good gray scale is established by viewing B/W color bar pattern.
20. In the Serviceman Mode for making electronic adjustments select the DAC DRIVE adjustments (C4) GRN, (C5) BLUE and adjust for warm white in a white color bar pattern.
21. EXIT the Serviceman Mode.
22. Adjust the Picture Menu Video Adjustments **Bright** and **Picture** from low scale to high scale and check Black and White tracking.
23. If correction is needed: Re-Enter the Serviceman Mode and perform the **Minor Touch – Up Method.**
24. Perform **Sub-Brightness** Adjustment procedure if needed.

Horizontal Centering

Serviceman DAC Adjustment (D0)
Preparation:
Connect a crosshatch generator.
Procedure:
1. In the Serviceman Mode for making electronic adjustments. Select the Horizontal Centering Adjustment DAC (D0) and adjust until the center of the crosshatch pattern is centered on CRT.
2. EXIT the Serviceman Adjustment Mode.

MTS Circuit Adjustments

The MTS Circuit Adjustments require two steps:
1. Input Level Adjustment.
2. Stereo Separation Adjustment.

Input Level Adjustment (M0)

Preparation:
1. Connect an RMS meter with filter jig as shown in Fig. 10.

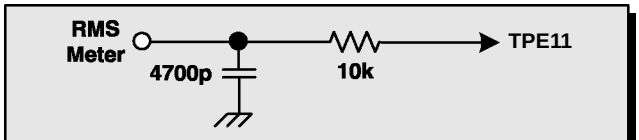


Figure 10. **Filter Jig**

2. Connect an RF signal generator to the RF antenna input.

Procedure:
1. Apply the following signal from the RF signal generator:
Video: 100 IRE flat field, 30% modulation.
Audio: 300Hz, 100% modulation, monaural (70 ±5dB, 75Ω OPEN, P/S 10dB).
2. Adjust the MTS Input Level Adjustment (M0) until the voltage measured is 106 ± 6.0mV rms.

Stereo Separation Adjustment (M1 & M2)

Preparation:
1. Connect an RF signal generator to the RF antenna input.
2. Connect a scope to TPE10.

Procedure:
1. Select Stereo Mode in Audio menu
2. Apply the following signal from the RF signal generator:
Video: 100 IRE flat field, 30% modulation.
Audio: 300Hz, 100% modulation, stereo (left only) (70 ±5dB, 75Ω OPEN, P/S 10dB).
3. Adjust the MTS Low-Level Separation Adjustment (M1) until the amplitude displayed on the scope is minimum.
4. Apply the following signal from the RF signal generator:
Video: 100 IRE flat field, 30% modulation.
Audio: 3KHz, 100% modulation, stereo (left only) (70 ±5dB, 75Ω OPEN, P/S 10dB).
5. Adjust the MTS High-Level Separation Adjustment (M2) until the amplitude displayed on the scope is minimum.
6. Repeat above steps 2 through 5 until the amplitude is at minimum for both signals.

Clock Adjustment (S7)

Preparation:

Connect the frequency counter from TPS1 (IC001 Pin 13) to cold ground (⏚).

Note: *Frequency Counter probe capacitance should be 8pF or less.*

Procedure:

1. Turn the Receiver "OFF" with the AC power applied.
2. Measure TPS1 (IC001 pin 13) for the frequency of the waveform and record the reading.

Note: *Pin 13 measurement must have at least four digits of resolution following the decimal point. Example: 000.0000*

3. Turn the Receiver back "ON".
4. Place the Receiver into Serviceman Mode for making electronic adjustment, select the Clock Adjustment DAC (S7).
5. Calculate and set S7 based on the following formula:

During "turn on" conditions:

$$S7 = 128 + (873.90625 - F) \times 968$$

During "standby" conditions:

$$S7 = 128 + (218.47656 - F) \times 3873$$

Note: *Pin 13 measurement will not change regardless of the value stored in S7.*

Vertical Size (D1)

1. Adjust the VERTICAL SIZE DAC control, D1, until the top and the bottom edges of the raster are visible.
2. Adjust the VERTICAL SIZE control, D1, until the top and the bottom of the raster touch the bezel edge. The advance SIZE control to obtain an approximately 10% overscan. Linearity adjustment is done automatically when the size is being adjusted. (Best results can de obtained with a round test patter.)

Service Adjustments (Mechanical Controls)

Focus (part of T551)

Preparation:

Connect a Signal generator and select a dot pattern.

Procedure:

Adjust the FOCUS control to obtain the sharpest and clearest dot pattern.

a. Adjust for best center.
b. Adjust for best area between the center and top right corner.

Component identification

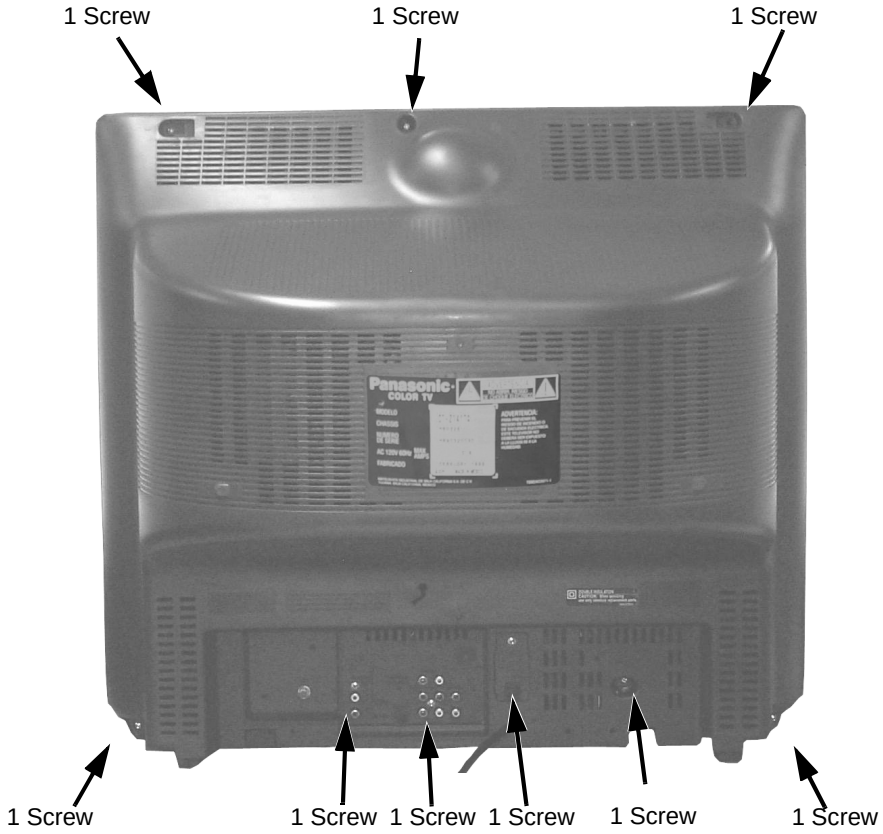
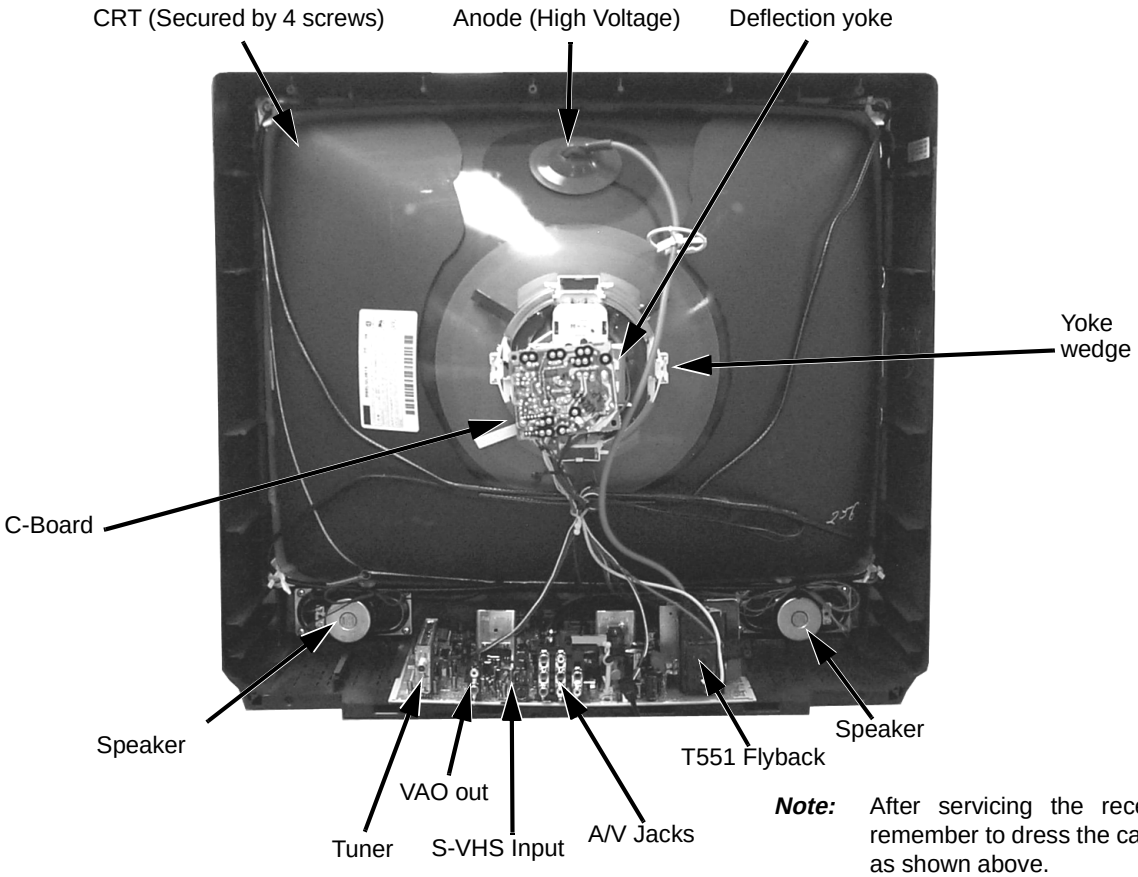
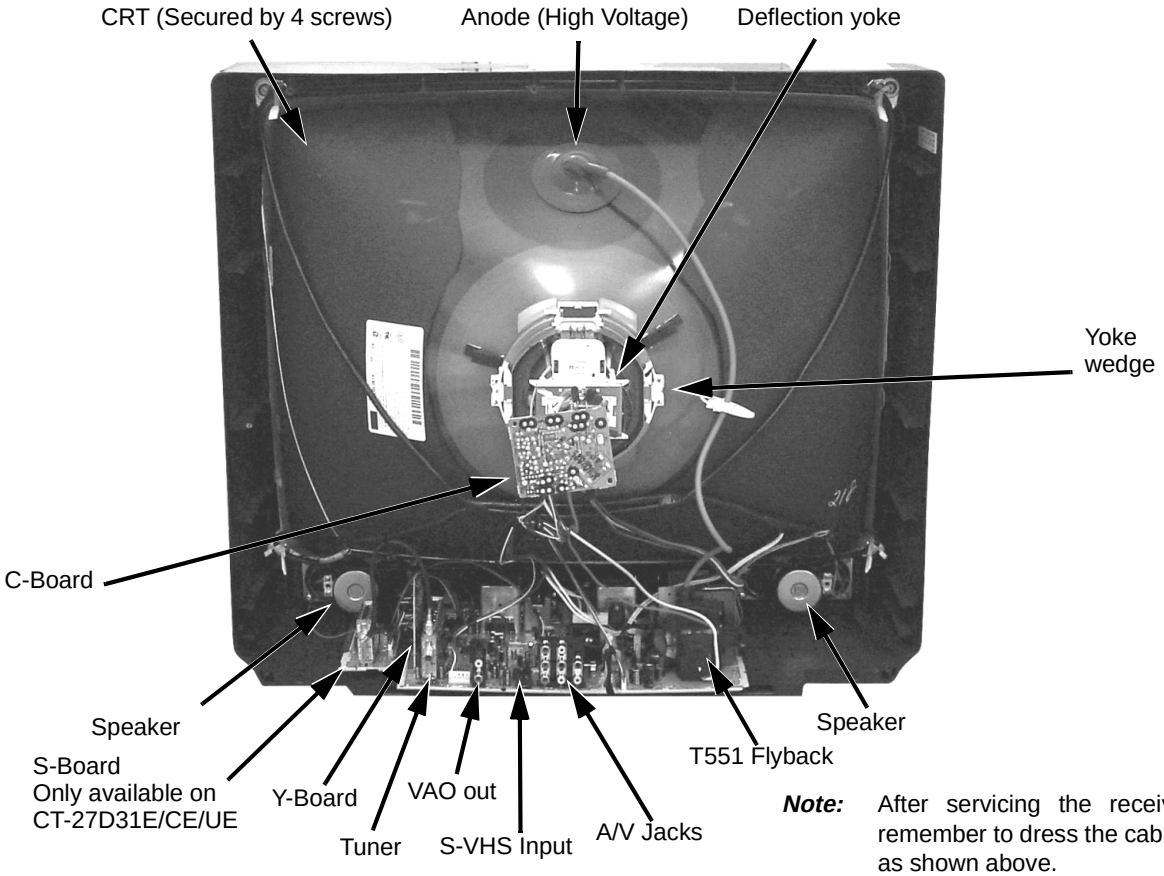


Figure 11. **Cabinet Back**



Note: After servicing the receiver, remember to dress the cables, as shown above.

Figure 12. **Rear View (CT-27D11E/DE/UE)**



Note: After servicing the receiver, remember to dress the cables, as shown above.

Figure 13. **Rear View (CT-27D31E/CE/UE CT-27D21E/UE & CT-2772SE/SCE/SUE)**

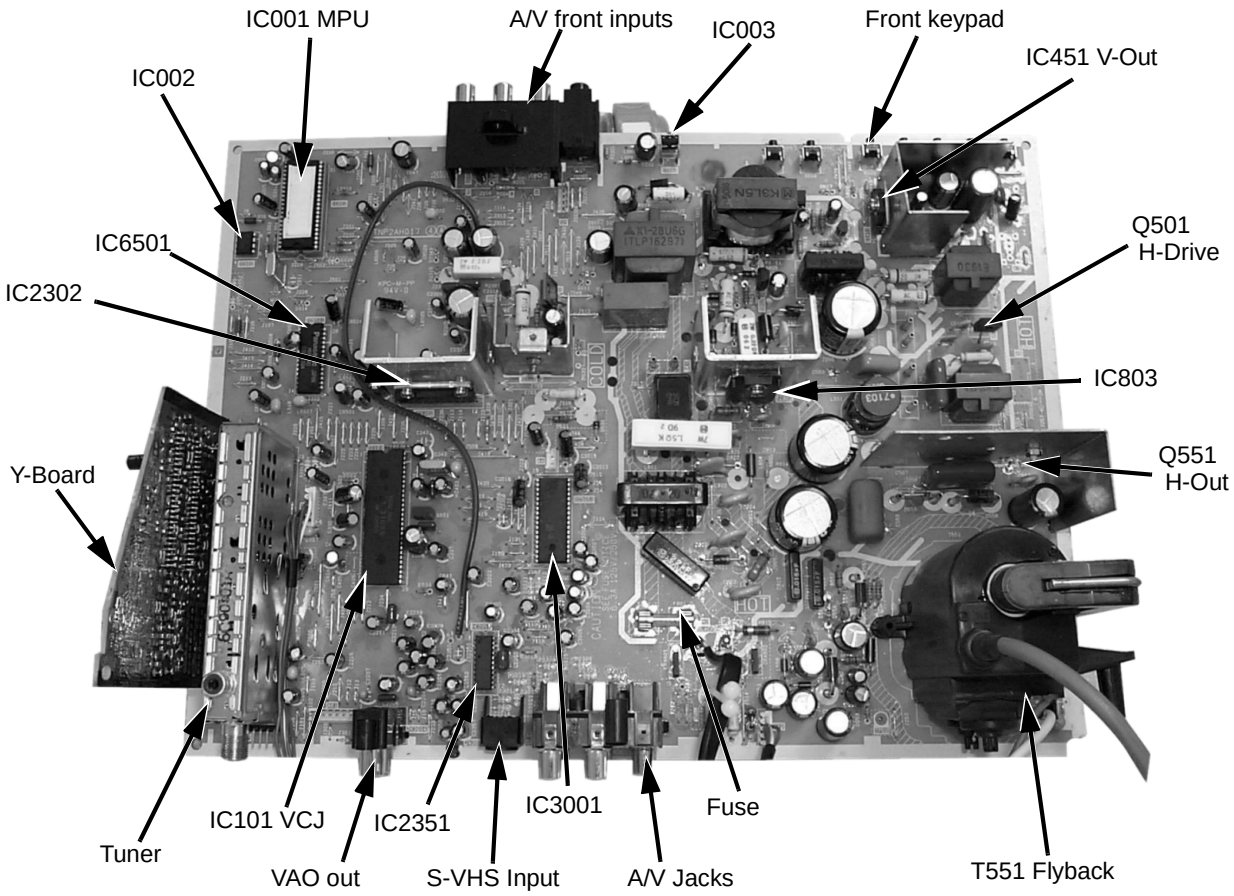


Figure 14. **Component view**

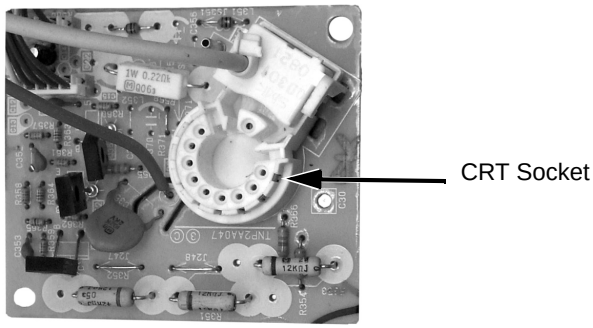


Figure 15. **C -Board (All Models)**

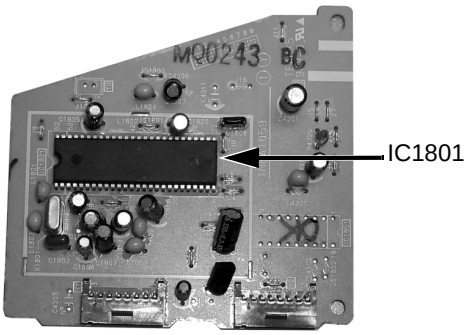


Figure 16. **Y Board (CT-27D21E/UE, CT-2772SE/SCE/SUE & CT-27D31E/CE/UE)**

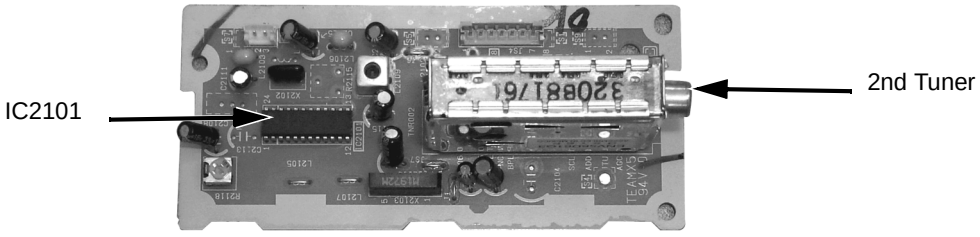


Figure 17. **S-Board (CT-27D31E/CE/UE)**

REPLACEMENT PARTS LIST

Models: CT-27D11E/DE/UE, CT-27D21E/UE, CT-27D31E/CE/UE & CT-2772SE/SCE/SUE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
		CAPRISTORS
CRA801	**TP00842-51**	**TAPING GAP TERMINAL**
CRA802	**TP00842-51**	**TAPING GAP TERMINAL**
		CAPACITORS
C001	ECA1CM470B	CAP,E 47UF/16V
C002	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C003	ECA1HM4R7B	CAP,E 4.7UF-50V
C005	ECA1CM470B	CAP,E 47UF/16V
C006	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C008	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C009	ECJ2VC1H560J	CAP,C 56PF-J-50V
C010	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C013	ECA0JM101B	CAP,E 100UF-6.3V
C016	ECJ2VC1H101J	CAP,C 100PF-J-50V
C017	ECJ2VC1H270J	CAP,C 27PF-J-50V
C018	ECJ2VC1H270J	CAP,C 27PF-J-50V
C020	ECA0JM331B	CAP,E 330UF-6.3V
C021	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C022	ECA1EM471B	CAP,E 470UF-25V
C024	ECA1HM4R7B	CAP,E 4.7UF-50V
C025	ECA1HM010B	CAP,E 1UF-50V
C026	ECA1HM010B	CAP,E 1UF-50V
C032	ECA1CM331B	CAP,E 330UF-16V
C033	ECJ2VC1H680J	CAP,C 68PF-J-50V
C034	ECJ2VC1H680J	CAP,C 68PF-J-50V
C043	ECA1HM2R2B	CAP,E 2.2UF-50V
C044	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C047	ECA0JM102B	CAP,E 1000UF-6.3V
C048	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C201	ECJ2VB1C104K	CAP,C .1UF-K-16V
C224	ECJ2VB1C104K	CAP,C .1UF-K-16V
C225	ECJ2VB1C104K	CAP,C .1UF-K-16V
C226	ECJ2VB1C104K	CAP,C .1UF-K-16V
C301	ECJ2VB1C104K	CAP,C .1UF-K-16V
C302	ECJ2VB1C104K	CAP,C .1UF-K-16V
C303	ECJ2VB1C104K	CAP,C .1UF-K-16V
C307	ECA1HM0R1B	CAP,E 0.1UF/50V
C309	ECJ2VC1H390J	CAP,C 39PF-J-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C310	ECJ2VC1H390J	CAP,C 39PF-J-50V
C314	EEANA1E1R0B	CAP,E 1.0UF-25V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C315	EEANA1E1R0B	CAP,E 1.0UF-25V
C320	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C321	ECJ2VB1H103K	CAP,C .01UF-K-50V
C322	ECJ2VB1H103K	CAP,C .01UF-K-50V
C323	ECJ2VB1H103K	CAP,C .01UF-K-50V
C324	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C330	ECA1AM101B	CAP,E 100UF-10V
C331	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C337	ECA1HM2R2B	CAP,E 2.2UF-50V

REF NO.	PART NO.	DESCRIPTION
C342	ECA1HM010B	CAP,E 1UF-50V
C351	TACCW331T50V	CAP,C 330PF/50V
C352	TACCW331T50V	CAP,C 330PF/50V
C353	TACCW331T50V	CAP,C 330PF/50V
C354	ECKW3D102KBN	CAP,C .001UF-K-2KVDC
C357	EEANA1E1R0B	CAP,E 1.0UF-25V
C401	ECJ2VB1C104K	CAP,C .1UF-K-16V
C403	ECA1HM010B	CAP,E 1UF-50V
C404	ECA1HM010B	CAP,E 1UF-50V
C405	ECSF1EE105VB	CAP,E 1.0UF-25V
C407	ECA1CM100B	CAP,E 10UF-16V
C409	ECJ2VC1H101J	CAP,C 100PF-J-50V
C415	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C451	ECA1HM2R2B	CAP,E 2.2UF-50V
C452	ECQB1H473JM3	CAP,P .047UF-J-50V
C453	ECA1VM471B	CAP,E 470UF-35V
C454	ECA1VHG221E	CAP,E 220UF-35V
C455	ECA1EM222E	CAP,E 2200UF-25V
C456	ECCR1H020CC5	CAP,C 2PF-C-50V
C457	ECJ2VB1C104K	CAP,C .1UF-K-16V
C458	ECA1CM101B	CAP,E 100UF/16V
C459	ECQM1104JZW	CAP,P .10UF-J-100V
C502	ECA1CM221B	CAP,E 220UF-16V
C503	ECJ2VC1H221J	CAP,C 220PF-J-50V
C504	ECQB1H222JM3	CAP,P 2200PF-J-50V
C505	ECJ2VC1H180J	CAP,C 18PF-J-50V
C506	ECA1CM471B	CAP,E 470UF-16V
C507	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C508	ECJ2VC1H102J	CAP,C .001UF-J-50V
C510	ECCR2H100D5	CAP,C 10PF-D-500V
C511	ECKR2H821KB5	CAP,C 820PF-K-500V
C512	ECKR2H101KB5	CAP,C 100UF-K-500V
C514	ECA1HMR22B	CAP,E .22UF-50V
C515	ECJ2VC1H222J	CAP,C .0022UF-J-50V
C516	ECJ2VC1H391J	CAP,C 390PF-J-50V
C517	ECJ2VC1H221J	CAP,C 220PF-J-50V
C518	ECJ2VC1H151J	CAP,C 150PF-J-50V
C519	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C531	**ECA1EM220B**	**CAP,E 22UF-25V**
C551	**ECA1VM331B**	**CAP,E 330UF-35V**
C552	**ECA1CM331B**	**CAP,E 330UF-16V**
C553	**ECA1CM331B**	**CAP,E 330UF-16V**
C554	ECKR2H561KB5	CAP,C 560PF-K-500V
C555	**ECA2EM220E**	**CAP,E 22UF-250V**
C556	**ECA1CM102B**	**CAP,E 1000UF/16V**
C557	ECKR2H102KB5	CAP,C 1000PF-K-500V
C558	**ECA1CM221B**	**CAP,E 220UF-16V**
C560	**ECEA1HN2R2UB**	**CAP,E 2.2UF-50V**
C561	ECKR2H561KB5	CAP,C 560PF-K-500V
C562	ECKR2H561KB5	CAP,C 560PF-K-500V
C563	**ECWH12H822JS**	**CAP,P .0082UF-J-1.2KV**

REPLACEMENT PARTS LIST

Models: CT-27D11E/DE/UE, CT-27D21E/UE, CT-27D31E/CE/UE & CT-2772SE/SCE/SUE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C564	**ECWH12H272JS**	**CAP,P .0027UF-J-1.2KV**
C565	**ECKW3D122JBR**	**CAP,C 1200PF-J-2KV**
C566	**ECKW3D181JBP**	**CAP,C 180PF-J-2KV**
C568	**ECQM2274JZW**	**CAP,P .27UF-J-200V**
C569	**TACFV2E474J**	**CAP,M .47UF-J-200V**
C571	ECA1CM471B	CAP,E 470UF-16V
C572	ECA1CM100B	CAP,E 10UF-16V
C573	ECA1CM101B	CAP,E 100UF/16V
C601	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C603	ECQB1H223JM3	CAP,P .022UF-J-50V
C616	ECJ2VB1C104K	CAP,C .1UF-K-16V
C641	ECA1HM100B	CAP,E 10UF/50V
C801	**ECKWAE472ZED**	**CAP,C 4700PF-Z-500V**
C802	**ECKWAE472ZED**	**CAP,C 4700PF-Z-500V**
C803	**ECKWAE472ZED**	**CAP,C 4700PF-Z-500V**
C804	**ECKWAE472ZED**	**CAP,C 4700PF-Z-500V**
C805	**EC0S2DA221BB**	**CAP,E 220UF/200V**
C806	**EC0S2DA221BB**	**CAP,E 220UF/200V**
C807	ECA1HM2R2B	CAP,E 2.2UF-50V
C808	ECA1CM101B	CAP,E 100UF/16V
C809	**EC0S2DG151DG**	**CAP,E 151UF/200V**
C810	**ECQU2A153MVA**	**CAP,P .015UF-M-250VAC**
C811	**ECQU2A153MVA**	**CAP,P .015UF-M-250VAC**
C812	**ECQU2A224MVA**	**CAP,P .22UF-M-250VAC**
C814	ECQB1H823JM3	CAP,P .082UF-J-50V
C815	ECA1EHG101B	CAP,E 100UF-25V
C818	ECKW3A821KBP	CAP,C 820PF-K-1KVDC
C820	**ECA1JHG100B**	**CAP,E 10UF-63V**
C821	ECKR2H561KB5	CAP,C 560PF-K-500V
C822	**ECA1EM221B**	**CAP,E 220UF-25V**
C823	**ECA160V33UE**	**CAP,E 33UF/160V**
C824	ECKW3A331KBP	CAP,C 330PF-K-1KV
C825	ECKW3A471KBP	CAP,C 470PF-K-1KV
C1801	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1802	ECQV1H154JM3	CAP,P .15UF-J-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1803	ECA1HMR22B	CAP,E .22UF-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1804	ECEA1HKAR22B	CAP,E .22UF-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1805	ECJ2VF1H333Z	CAP,C .033UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1806	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1807	ECA1CM470B	CAP,E 47UF/16V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1808	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1809	ECA1CM470B	CAP,E 47UF/16V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1810	ECJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*

REF NO.	PART NO.	DESCRIPTION
C1811	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1812	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1813	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1814	ECA1CM470B	CAP,E 47UF/16V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1815	ECJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1816	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1817	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1818	ECA1CM100B	CAP,E 10UF-16V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1819	ECJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1820	ECA1CM470B	CAP,E 47UF/16V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1821	ECJ2VC1H150J	CAP,C 15PF-J-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1822	ECJ2VC1H120J	CAP,C 12PF-J-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1823	ECJ2VC1H680J	CAP,C 68PF-J-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1826	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1827	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1828	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1829	ECJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1830	ECJ2VC1H560J	CAP,C 56PF-J-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1831	ECJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1832	ECJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1833	ECJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1835	ECA1CM100B	CAP,E 10UF-16V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1836	ECJ2VC1H680J	CAP,C 68PF-J-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1837	ECJ2VF1H104Z	CAP,C .1UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1839	ECJ2VC1H680J	CAP,C 68PF-J-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C1840	ECJ2VC1H680	J CAP,C 68PF-J-50 *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C2105	ECA0JM101B	CAP,E 100UF-6.3V *CT-27D31E/CE/UE*
C2106	ECA1HMR47B	CAP,E .47UF-50V *CT-27D31E/CE/UE*
C2108	ECA1CM330B	CAP,E 33UF-16V *CT-27D31E/CE/UE*
C2109	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D31E/CE/UE*
C2111	ECEA1HFSR22B	CAP,E .22UF-50V *CT-27D31E/CE/UE*

REPLACEMENT PARTS LIST

Models: CT-27D11E/DE/UE, CT-27D21E/UE, CT-27D31E/CE/UE & CT-2772SE/SCE/SUE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
C2114	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D31E/CE/UE*
C2115	ECA1HM100B	CAP,E 10UF/50V *CT-27D31E/CE/UE*
C2116	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D31E/CE/UE*
C2118	ECJ2VC1H270J	CAP,C 27PF-J-50V *CT-27D31E/CE/UE*
C2119	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D31E/CE/UE*
C2120	ECEA1HFSR47B	CAP,E .47UF-50V *CT-27D31E/CE/UE*
C2121	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D31E/CE/UE*
C2123	ECJ2VC1H270J	CAP,C 27PF-J-50V *CT-27D31E/CE/UE*
C2124	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D31E/CE/UE*
C2125	ECA1CM100B	CAP,E 10UF-16V *CT-27D31E/CE/UE*
C2126	ECA1HMR22B	CAP,E .22UF-50V *CT-27D31E/CE/UE*
C2202	ECA1HM2R2B	CAP,E 2.2UF-50V
C2203	ECA1HM4R7B	CAP,E 4.7UF-50V
C2204	AP106K016CAE	CAP,T 10UF/16V
C2205	ECA1HM010B	CAP,E 1UF-50V
C2206	ECQB1H223JM3	CAP,P .022UF-J-50V
C2207	AP335K016CAE	CAP,T 3.3UF/16V
C2208	ECJ2VB1C104K	CAP,C .1UF-K-16V
C2209	ECJ2VB1C104K	CAP,C .1UF-K-16V
C2210	ECJ2VB1C104K	CAP,C .1UF-K-16V
C2211	ECA1CM100B	CAP,E 10UF-16V
C2212	ECQB1H473JM3	CAP,P .047UF-J-50V
C2215	ECA0JM101B	CAP,E 100UF-6.3V
C2218	ECA1HMR47B	CAP,E .47UF-50V
C2301	ECA1VM102E	CAP,E 1000UF-35V
C2302	ECA1HM010B	CAP,E 1UF-50V
C2305	ECA1HM010B	CAP,E 1UF-50V
C2306	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C2307	ECA1CM102B	CAP,E 1000UF/16V
C2309	ECQB1H473JM3	CAP,P .047UF-J-50V
C2311	ECA1HM3R3B	CAP,E 3.3UF-50V
C2313	ECA1EM101B	CAP,E 100UF-25V
C2314	ECQB1H473JM3	CAP,P .047UF-J-50V
C2315	ECA1EM100B	CAP,E 10UF-25V
C2321	ECA1EM100B	CAP,E 10UF-25V
C2324	ECA1EM100B	CAP,E 10UF-25V
C2325	ECA1CM102B	CAP,E 1000UF/16V
C2326	ECJ2VB1H223K	CAP,C .022UF-K-50V
C2327	ECJ2VB1H223K	CAP,C .022UF-K-50V
C2328	ECJ2VB1H223K	CAP,C .022UF-K-50V
C2329	ECJ2VB1H223K	CAP,C .022UF-K-50V
C2331	ECA1HM010B	CAP,E 1UF-50V
C2333	ECA1HM010B	CAP,E 1UF-50V
C2339	ECA1HM010B	CAP,E 1UF-50V
C2340	ECA1HM010B	CAP,E 1UF-50V
C2342	ECA1AM470B	CAP,E 47UF-10V
C2351	ECJ2VB1C104K	CAP,C .1UF-K-16V
C2352	ECJ2VB1H472K	CAP,C .0047UF-K-50V
C2353	ECA1HM4R7B	CAP,E 4.7UF-50V
C2354	ECA1HM4R7B	CAP,E 4.7UF-50V
C2355	ECA1HM4R7B	CAP,E 4.7UF-50V
C2356	ECA1HMR47B	CAP,E .47UF-50V
C2357	ECA1CM100B	CAP,E 10UF-16V
C2359	ECJ2VB1C104K	CAP,C .1UF-K-16V
C2360	ECJ2VB1H472K	CAP,C .0047UF-K-50V
C2361	ECA1AM470B	CAP,E 47UF-10V
C2362	ECQB1H104JM3	CAP,P .1UF-J-50V
C2363	ECJ2VB1C104K	CAP,C .1UF-K-16V
C2364	ECA1HM4R7B	CAP,E 4.7UF-50V
C2365	ECA1AM470B	CAP,E 47UF-10V
C2366	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C3001	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C3002	ECA1AM101B	CAP,E 100UF-10V
C3003	ECA1CM100B	CAP,E 10UF-16V
C3004	ECA1HM010B	CAP,E 1UF-50V
C3006	ECA1HM010B	CAP,E 1UF-50V
C3007	ECA1CM100B	CAP,E 10UF-16V
C3008	ECA1CM100B	CAP,E 10UF-16V
C3009	ECA1HM010B	CAP,E 1UF-50V
C3010	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C3011	ECA1HM010B	CAP,E 1UF-50V
C3012	ECA1CM100B	CAP,E 10UF-16V
C3013	ECA1CM100B	CAP,E 10UF-16V
C3014	ECA1HM010B	CAP,E 1UF-50V
C3016	ECA1HM010B	CAP,E 1UF-50V
C3018	ECA1CM100B	CAP,E 10UF-16V
C3019	ECA1CM100B	CAP,E 10UF-16V
C3020	ECA1HM010B	CAP,E 1UF-50V
C3021	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C3022	ECA1HM010B	CAP,E 1UF-50V
C3023	ECA1CM100B	CAP,E 10UF-16V
C4301	ECA0JM331B	CAP,E 330UF-6.3V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C4304	ECEA1CKA100B	CAP,E 10UF-16V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C4307	ECEA1CKN100B	CAP,E 10UF-16V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C4313	ECJ2VB1H561K	CAP,C 560PF-K-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C4314	ECA1HMR47B	CAP,E .47UF-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C4315	ECJ2VB1H152K	CAP,C .0015UF-K-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C4316	ECA0JM331B	CAP,E 330UF-6.3V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C4317	ECJ2VF1H103Z	CAP,C .01UF-Z-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C4319	ECJ2VC1H391J	CAP,C 390PF-J-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C4320	ECJ2VB1H681K	CAP,C 680PF-K-50V *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
C6501	ECA0JM101B	CAP,E 100UF-6.3V
C6502	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6504	ECJ2VC1H270J	CAP,C 27PF-J-50V

REPLACEMENT PARTS LIST

Models: CT-27D11E/DE/UE, CT-27D21E/UE, CT-27D31E/CE/UE & CT-2772SE/SCE/SUE

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REF NO.	PART NO.	DESCRIPTION
C6507	ECJ2VC1H120J	CAP,C 12PF-J-50V
C6510	ECJ2VC1H120J	CAP,C 12PF-J-50V
C6511	ECA1HM010B	CAP,E 1UF-50V
C6512	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6513	ECJ2VC1H270J	CAP,C 27PF-J-50V
C6516	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6517	ECEA1HN010UB	CAP,E 1UF/50V
C6518	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6520	ECA1CM100B	CAP,E 10UF-16V
C6521	ECA1AM470B	CAP,E 47UF-10V
C6522	ECJ2VC1H221J	CAP,C 220PF-J-50V
C6523	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C6524	ECA1HM010B	CAP,E 1UF-50V
C6525	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6526	ECA1CM100B	CAP,E 10UF-16V
C6527	ECJ2VF1H104Z	CAP,C .1UF-Z-50V
C6528	ECA1AM470B	CAP,E 47UF-10V
C6529	ECA1CM100B	CAP,E 10UF-16V
C6531	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
C6532	ECJ2VF1H103Z	CAP,C .01UF-Z-50V
JS2306	ECJ2VB1H472K	CAP,C .0047UF-K-50V
		DIODES
D001	ERA15-01V3	DIODE, RECTIFIER
D002	MA165TA5VT	DIODE, SWITCHING
D003	MA4056MTA	DIODE
D006	MA4330HTA	DIODE
D007	ERA15-01V3	DIODE, RECTIFIER
D008	ERA15-01V3	DIODE, RECTIFIER
D009	ERA15-01V3	DIODE, RECTIFIER
D011	MA165TA5VT	DIODE, SWITCHING
D014	MA165TA5VT	DIODE, SWITCHING
D015	MA165TA5VT	DIODE, SWITCHING
D018	MA165TA5VT	DIODE, SWITCHING
D451	ERA15-01V3	DIODE, RECTIFIER
D502	**MA4062LTVTA**	**DIODE, ZENER**
D530	MA4082LTA	DIODE
D531	**AS01V0**	**DIODE**
D532	MA4091LTA	DIODE
D533	MA4091MTA	DIODE
D551	**TVSRU2NV1**	**DIODE, SILICONE**
D554	**BYD33G-163**	**DIODE**
D555	MA165TA5VT	DIODE, SWITCHING
D556	MA4360HTA	DIODE, ZENER
D557	**TVSRU2NV1**	**DIODE, SILICONE**
D558	**RS3FS**	**DIODE**
D559	**BYD33G-113**	**DIODE**
D561	**BYD33G-163**	**DIODE**
D801	**GP15KL-042**	**DIODE**
D802	**GP15KL-042**	**DIODE**
D805	**TAP111M003**	**DIODE**
D806	**MA4047MTA**	**DIODE**

REF NO.	PART NO.	DESCRIPTION
D807	MA165TA5VT	DIODE, SWITCHING
D809	**RU3YX-MV1**	**DIODE, RECTIFIER**
D820	EU02V1	DIODE
D821	EU02V1	DIODE
D822	EU02V1	DIODE
D823	RL30A	DIODE
D824	EU02V1	DIODE
D825	**TVSSR2KLV1**	**DIODE, PROTECTION**
D826	EU02V1	DIODE
D829	MA165TA5VT	DIODE, SWITCHING
D830	**MA4270MTA**	**DIODE**
D2101	MA3330MTX	DIODE *CT-27D31E/CE/UE*
D2301	MA165TA5VT	DIODE, SWITCHING
D2305	MA4110MTA	DIODE, ZENER
D2306	MA4110MTA	DIODE, ZENER
D2307	MA4110MTA	DIODE, ZENER
D2308	MA4110MTA	DIODE, ZENER
D2309	MA4110MTA	DIODE, ZENER
D2310	MA4110MTA	DIODE, ZENER
D2311	MA4110MTA	DIODE, ZENER
D2312	MA4110MTA	DIODE, ZENER
D2315	MA165TA5VT	DIODE, SWITCHING
D2342	MA165TA5VT	DIODE, SWITCHING
D2343	MA165TA5VT	DIODE, SWITCHING
D3001	MA4110MTA	DIODE, ZENER
D3002	MA4110MTA	DIODE, ZENER
D3003	MA4110MTA	DIODE, ZENER
D3004	MA4110MTA	DIODE, ZENER
D3005	MA4110MTA	DIODE, ZENER
D3006	MA4110MTA	DIODE, ZENER
D3007	MA4110MTA	DIODE, ZENER
D3008	MA4110MTA	DIODE, ZENER
D3009	MA4110MTA	DIODE, ZENER
D3010	MA4110MTA	DIODE, ZENER
D3011	MA4110MTA	DIODE, ZENER
D3012	MA4110MTA	DIODE, ZENER
D3017	MA4110MTA	DIODE, ZENER
D3018	MA4110MTA	DIODE, ZENER
D3019	MA4110MTA	DIODE, ZENER
D3020	MA4110MTA	DIODE, ZENER
D3021	MA4110MTA	DIODE, ZENER
D3022	MA4110MTA	DIODE, ZENER
D4301	MA3036HTX	DIODE *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
		FUSES
F801	**XBA2A00101**	**FUSE 6.3A 125V**
		INTEGRATED CIRCUITS
IC001	**MN101C46FTE**	**INT CKT**
IC002	C3EAFC000011	INT CKT
IC003	PIC-26042SR	INT CKT
IC005	PQ1R33	INT CKT

REPLACEMENT PARTS LIST

Models: CT-27D11E/DE/UE, CT-27D21E/UE, CT-27D31E/CE/UE & CT-2772SE/SCE/SUE

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REF NO.	PART NO.	DESCRIPTION
IC006	PST9229NR	INT CKT (RESET)
IC101	**TA1310BN**	**INT CKT**
IC451	**LA7845N**	**INT CKT**
IC551	AN78M09LB	INT CKT
IC552	AN7805LB	INT CKT
IC801	**PC817X2**	**INT CKT**
IC803	**STR58041A**	**INT CKT**
IC1801	M65617SP	INT CKT *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
IC2101	AN5170K	INT CKT *CT-27D31E/CE/UE*
IC2201	AN5849S-E1V	INT CKT
IC2302	AN5272	INT CKT
IC2351	CXA2021S	INT CKT
IC3001	M52790SP	INT CKT A/V SWITCH
IC6501	MN82840	INT CKT
IC6502	PST9142NR	INT CKT
Q551	**2SC5339LBMA1**	**INT CKT**
	COILS	
J118	EXCELDR35V	FERRITE BEAD
J430	EXCELSA39V	FERRITE BEAD
J437	EXCELSA39V	FERRITE BEAD
J443	EXCELSA26T	FERRITE BEAD
J511	EXCELSA26T	FERRITE BEAD
L001	EXCELSA26T	FERRITE BEAD
L002	TLTABT2R2K	COIL, PEAKING 2.2UH
L003	TLTABT2R2K	COIL, PEAKING 2.2UH
L004	TLTABT2R2K	COIL, PEAKING 2.2UH
L005	ELESN330KA	COIL, PEAKING 33UH
L006	EXCELSA24T	FERRITE BEAD
L007	ELESN180JA	COIL, PEAKING 18UH
L008	TLTABT470K	COIL, PEAKING 47UH
L010	TLTABT2R2K	COIL, PEAKING 2.2UH
L011	TLTABT2R2K	COIL, PEAKING 2.2UH
L012	TLTABT2R2K	COIL, PEAKING 2.2UH
L013	TLTABT2R2K	COIL, PEAKING 2.2UH
L106	EXCELSA26T	FERRITE BEAD
L218	EXCELSA26T	FERRITE BEAD
L319	TLTABT101K	COIL, PEAKING
L351	TLTABT101K	COIL, PEAKING
L501	ELESN3R3KA	COIL, PEAKING 3.3UH
L518	ELESN120JA	COIL, PEAKING 12UH
L541	EXCELDR35V	FERRITE BEAD
L551	**ELH5L7103**	**COIL**
L554	EXCELSA24T	FERRITE BEAD
L555	EXCELSA24T	FERRITE BEAD
L556	EXCELSA24T	FERRITE BEAD
L801	**ELF20N020A**	**COIL, 2UH**
L803	**ELF17N007A**	**LINE FILTER**
L804	EXCELSA39V	FERRITE BEAD
L1801	ELESN1R5KA	COIL, PEAKING 1.5UH *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
L1803	ELESN2R2KA	COIL, PEAKING 2.2UH *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
L1804	ELESN150JA	COIL, PEAKING 15UH *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
L1806	ELESN1R0KA	COIL, PEAKING 1.0UH *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
L1807	ELESN1R0KA	COIL, PEAKING 1.0UH *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
L1808	EXCELDR25V	FERRITE BEAD *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
L2103	ELESN150KA	COIL, PEAKING 15UH *CT-27D31E/CE/UE*
L2106	ELESN560KA	COIL, PEAKING 56UH *CT-27D31E/CE/UE*
L2109	EIV7EN053B	COIL, VCO *CT-27D31E/CE/UE*
L2310	TLTABT2R2K	COIL, PEAKING 2.2UH
L4301	ELESN3R9KA	COIL, PEAKING 3.9UH *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
L6502	ELESN330JA	COIL, PEAKING 33UH
L6505	ELESN330JA	COIL, PEAKING 33UH
L6507	ELESN150KA	COIL, PEAKING 15UH
L6508	EXCELSA26T	FERRITE BEAD
	TRANSISTORS	
Q001	2SD601ARTX	TRANSISTOR
Q002	2SC1685QRSTA	TRANSISTOR
Q003	2SD601ARTX	TRANSISTOR
Q004	2SC1685QRSTA	TRANSISTOR
Q005	2SD601ARTX	TRANSISTOR
Q201	2SD601ARTX	TRANSISTOR
Q302	2SD601ARTX	TRANSISTOR *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
Q303	2SD601ARTX	TRANSISTOR
Q351	2SC3063RL	TRANSISTOR
Q352	2SC3063RL	TRANSISTOR
Q353	2SC3063RL	TRANSISTOR
Q401	2SD601ARTX	TRANSISTOR
Q402	2SD601ARTX	TRANSISTOR
Q501	**2SC4212HLB**	**TRANSISTOR**
Q509	2SD601ARTX	TRANSISTOR
Q515	2SD601ARTX	TRANSISTOR
Q603	2SD601ARTX	TRANSISTOR
Q801	2SC1685RSTA	TRANSISTOR
Q802	2SC1384RS	TRANSISTOR
Q1801	2SD601ARTX	TRANSISTOR *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
Q1802	2SD601ARTX	TRANSISTOR *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
Q1803	2SD601ARTX	TRANSISTOR *CT-27D31E/CE/UE CT-27D21E/UE CT-2772SE/SCE/SUE*
Q1804	2SB709ARTX	TRANSISTOR *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
Q1805	2SB709ARTX	TRANSISTOR *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
Q2101	2SD601ARTX	TRANSISTOR *CT-27D31E/CE/UE*

REPLACEMENT PARTS LIST

Models: CT-27D11E/DE/UE, CT-27D21E/UE, CT-27D31E/CE/UE & CT-2772SE/SCE/SUE

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REF NO.	PART NO.	DESCRIPTION
Q2302	2SB709ARTX	TRANSISTOR
Q2303	2SD601ARTX	TRANSISTOR
Q2342	2SB709ARTX	TRANSISTOR
Q2343	2SD601ARTX	TRANSISTOR
Q2344	2SD601ARTX	TRANSISTOR
Q2409	2SD601ARTX	TRANSISTOR
Q2410	2SD601ARTX	TRANSISTOR
Q4309	2SB709ARTX	TRANSISTOR *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
Q4310	2SD601ARTX	TRANSISTOR *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
Q4311	2SB709ARTX	TRANSISTOR *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
Q4312	2SD601ARTX	TRANSISTOR *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
Q4313	2SD601ARTX	TRANSISTOR *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
Q4315	2SC1384QR	TRANSISTOR *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
Q6501	2SD601ARTX	TRANSISTOR
Q6502	2SD601ARTX	TRANSISTOR
Q6504	2SD601ARTX	TRANSISTOR
Q6505	2SD601ARTX	TRANSISTOR
Q6506	2SD601ARTX	TRANSISTOR
Q6509	2SD601ARTX	TRANSISTOR
Q6510	2SB709ARTX	TRANSISTOR
Q6514	2SB709ARTX	TRANSISTOR
Q6516	2SB709ARTX	TRANSISTOR
Q6517	2SD601ARTX	TRANSISTOR
Q6519	2SD601ARTX	TRANSISTOR
		RELAYS
RL801	**TSEH8007**	**RELAY**
		RESISTORS
R001	ERJ6GEYJ471V	RES,M 470-J-1/10W
R002	ERJ6GEYJ182V	RES,M 1.8K-J-1/10W
R003	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R004	ERDS1TJ122T	RES,C 1.2K-J-1/2W
R005	ERDS2TJ101T	RES,C 100-J-1/4W
R006	ERDS1TJ560T	RES,C 56-J-1/2W
R007	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R008	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R009	ERJ6GEYJ221V	RES,M 220-J-1/10W
R010	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R012	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R013	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R014	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R015	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R016	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R017	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R020	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R021	ERJ6GEYJ101V	RES,M 100-J-1/10W
R022	ERJ6GEYJ101V	RES,M 100-J-1/10W
R023	ERJ6GEYJ102V	RES,M 1K-J-1/10W

REF NO.	PART NO.	DESCRIPTION
R024	ERJ6GEYJ221V	RES,M 220-J-1/10W
R025	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R026	ERJ6GEYJ183V	RES,M 18K-J-1/10W *CT-27D31E/CE/UE*
R026	ERJ6GEYJ223V	RES,M 22K-J-1/10W *CT-27D21/UE CT-2772SE/SCE/SUE*
R027	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27D11E/UE CT-27D21E/UE CT-2772SE/SCE/SUE*
R027	ERJ6GEYJ223V	RES,M 22K-J-1/10W *CT-27D31E/CE/UE*
R028	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R029	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27D31E/CE/UE*
R030	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R032	ERJ6ENF1002V	RES,M 10K-F-1/10W
R033	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R034	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R035	ERJ6GEYJ362V	RES,M 3.6K-J-1/10W
R036	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R037	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R038	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R039	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R040	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R041	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R042	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R043	ERJ6GEYJ203V	RES,M 20K-J-1/10W *CT-27D31E/CE/UE*
R044	ERJ6GEYJ273V	RES,M 27K-J-1/10W
R045	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R046	ERJ6GEYJ333V	RES,M 33K-J-1/10W
R047	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R049	ERJ6GEYJ101V	RES,M 100-J-1/10W
R060	ERJ6GEYJ471V	RES,M 470-J-1/10W
R065	ERJ6GEYJ101V	RES,M 100-J-1/10W
R066	ERJ6GEYJ752V	RES,M 7.5K-J-1/10W
R067	ERJ6GEYJ752V	RES,M 7.5K-J-1/10W
R068	ERJ6GEYJ752V	RES,M 7.5K-J-1/10W
R072	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R073	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R074	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R075	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R076	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R077	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R078	ERJ6GEYJ101V	RES,M 100-J-1/10W
R079	ERJ6GEYJ101V	RES,M 100-J-1/10W
R201	ERJ6GEYJ331V	RES,M 330-J-1/10W
R223	ERJ6GEYJ561V	RES,M 560-J-1/10W
R225	ERJ6GEYJ331V	RES,M 330-J-1/10W
R226	ERJ6GEYJ331V	RES,M 330-J-1/10W
R245	ERJ6GEYJ224V	RES,M 220K-J-1/10W
R301	ERJ6GEYJ331V	RES,M 330-J-1/10W
R302	ERJ6GEYJ331V	RES,M 330-J-1/10W
R303	ERJ6GEYJ331V	RES,M 330-J-1/10W
R305	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R306	ERJ6GEYJ103V	RES,M 10K-J-1/10W

REPLACEMENT PARTS LIST

Models: CT-27D11E/DE/UE, CT-27D21E/UE, CT-27D31E/CE/UE & CT-2772SE/SCE/SUE

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REF NO.	PART NO.	DESCRIPTION
R309	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R310	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W
R312	ERJ6GEYJ393V	RES,M 39K-J-1/10W
R328	ERJ6GEYJ105V	RES,M 1M-J-1/10W
R341	ERJ6GEYJ474V	RES,M 470K-J-1/10W
R351	ERG2FJ123H	RES,M 12K-J-2W
R352	ERG2FJ123H	RES,M 12K-J-2W
R353	ERG2FJ123H	RES,M 12K-J-2W
R354	ERDS1TJ272T	RES,C 2.7K-J-1/2W
R355	ERDS1TJ272T	RES,C 2.7K-J-1/2W
R356	ERDS1TJ272T	RES,C 2.7K-J-1/2W
R357	ERDS2TJ181T	RES,C 180-J-1/4W
R358	ERDS2TJ181T	RES,C 180-J-1/4W
R359	ERDS2TJ181T	RES,C 180-J-1/4W
R360	ERDS2TJ821T	RES,C 820-J-1/4W
R361	ERDS2TJ821T	RES,C 820-J-1/4W
R362	ERDS2TJ821T	RES,C 820-J-1/4W
R363	ERDS2TJ101T	RES,C 100-J-1/4W
R364	ERDS2TJ101T	RES,C 100-J-1/4W
R365	ERDS2TJ101T	RES,C 100-J-1/4W
R401	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R402	ERJ6GEYJ471V	RES,M 470-J-1/10W
R403	ERJ6GEYJ622V	RES,M 6.2K-J-1/10W
R405	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R408	ERJ6GEYJ331V	RES,M 330-J-1/10W
R409	ERJ6GEYJ271V	RES,M 270-J-1/10W
R410	ERJ6ENF1272V	RES,M 12.7K-F-1/10W
R411	ERJ6ENF6801V	RES,M 6.8K-F-1/10W
R412	ERDS2TJ123T	RES,C 12K-J-1/4W
R452	ERDS1FJ1R8P	RES,C 1.8-J-1/2W
R453	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R454	ERJ6GEYJ473V	RES,M 47K-J-1/10W
R455	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R456	ERG3FJ151H	RES,M 150-J-3W
R457	ERDS1FJ1R5P	RES,C 1.5-J-1/2W
R458	ERDS1FJ2R7P	RES,C 2.7-J-1/2W
R459	ERDS2TJ122T	RES,C 1.2K-J-1/4W
R460	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R461	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R465	ERJ6GEYJ104V	RES,M 100K-J-1/10W
R468	ER0S2TKF4321	RES,M 4.32K-F-1/4W
R469	ER0S2TKF1471	RES,M 1.47K-F-1/4W
R470	ERDS2TJ102T	RES,C 1K-J-1/4W
R501	ERJ6GEYJ301V	RES,M 300-J-1/10W
R502	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R504	ERJ6GEYJ333V	RES,M 33K-J-1/10W
R505	ERDS1TJ181T	RES,C 180-J-1/2W
R506	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R507	ERJ6GEYJ561V	RES,M 560-J-1/10W
R508	ERJ6GEYJ471V	RES,M 470-J-1/10W
R509	ERJ6GEYJ221V	RES,M 220-J-1/10W
R510	**ERG3FJ222H**	**RES,M 2200-J-3W**
R511	**ERG3FJ272H**	**RES,M 2.7K-J-3W**
R512	ERG2FJ392H	RES,M 3.9K-J-2W
R513	ERJ6GEYJ471V	RES,M 470-J-1/10W
R514	ERJ6GEYJ152V	RES,M 1.5K-J-1/10W
R515	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R516	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R517	ERJ6GEYJ181V	RES,M 180-J-1/10W
R531	**ERD25FJ470P**	**RES,C 47-J-1/4W**
R532	**ERJ6ENF5602V**	**RES,M 56K-F-1/10W**
R533	**ERJ6ENF2102V**	**RES,M 21K-F-1/10W**
R550	**ERDS1FJ1R0P**	**RES,C 1.0-J-1/2W**
R551	**ERDS1FJ1R0P**	**RES,C 1.0-J-1/2W**
R552	**ERDS1FJ1R0T**	**RES,C 1.0-J-1/2W**
R553	ERG3FJ270H	RES,M 27-J-3W
R556	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R557	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R558	ERQ1CKPR22S	RES,F .22-K-1W
R559	ERG2FJ683H	RES,M 12K-J-2W
R560	TLTABT101K	COIL, PEAKING
R561	ERG2FJ102H	RES,M 1K-J-2W
R563	ERDS2TJ683T	RES,C 68K-J-1/4W
R564	ERDS2TJ823T	RES,C 82K-J-1/4W
R566	**ERDS1FJ1R0P**	**RES,C 1.0-J-1/2W**
R569	ERG2FJ683H	RES,M 12K-J-2W *CT-27D31E/CE/UE*
R573	ERG3FJ220H	RES,M 22-J-3W *CT-27D21E/UE CT-2772SE/SCE/SUE*
R574	ERG2FJ220H	RES,M 22-J-2W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R574	ERG2FJ270H	RES,M 27-J-2W *CT-27D11E/UE*
R601	ERJ6GEYJ391V	RES,M 390-J-1/10W
R618	ERJ6GEYJ474V	RES,M 470K-J-1/10W
R619	ERJ6GEYJ563V	RES,M 56K-J-1/10W
R620	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R801	**ERF7ZK1R5**	**RES,W 1.5-K-7W**
R804	ERW12PK1R8C	RES,W 1.8-K-1/2W
R805	ERDS2TJ274T	RES,C 27K-J-1/4W
R806	ERDS2TJ274T	RES,C 27K-J-1/4W
R808	ERDS1FJ1R0T	RES,C 1.0-J-1/2W
R809	ERDS1FJ1R0T	RES,C 1.0-J-1/2W
R810	ERDS1FJ272T	RES,C 2.7K-J-1/2W
R812	ERDS1TJ183T	RES,C 18K-J-1/2W
R813	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R815	**ERC12ZGM825D**	**RES,S 8.2MEG-M-1/2**
R818	**ERQ12HJR56P**	**RES,F .56-J-1/2W**
R820	ERJ6GEYJ273V	RES,M 27K-J-1/10W
R821	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W
R822	ERD50FJ474P	RES,C 470K-J-1/2W
R823	ERDS2TJ222T	RES,C 2.2K-J-1/4W
R824	ERG3FJ390H	RES,M 39-J-3W
R825	ERDS2TJ102T	RES,C 1K-J-1/4W

REPLACEMENT PARTS LIST

Models: CT-27D11E/DE/UE, CT-27D21E/UE, CT-27D31E/CE/UE & CT-2772SE/SCE/SUE

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REF NO.	PART NO.	DESCRIPTION
R826	ERF2AKR22P	RES,W .22-K-2W
R827	ERDS1FJ561P	RES,C 560-J-1/2W
R828	ERG3FJ470	RES,M 47-J-3W
R829	ERQ14AJ6R8P	RES,F 6.8-J-1W
R1801	ERJ6GEYJ301V	RES,M 300-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1802	ERJ6GEYJ104V	RES,M 100K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1803	ERJ6GEYJ474V	RES,M 470K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1804	ERJ6GEYJ202V	RES,M 2K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1805	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1807	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1808	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1809	ERJ6GEYJ473V	RES,M 47K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1810	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1811	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1812	ERJ6GEYJ153V	RES,M 15K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1813	ERJ6GEYJ153V	RES,M 15K-J-1/10W *CT-27D31E/CE/UE CT-27D21E/UE CT-2772SE/SCE/SUE*
R1814	ERJ6GEYJ271V	RES,M 270-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1815	ERJ6GEYJ361V	RES,M 360-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1818	ERJ6GEYJ101V	RES,M 100-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1819	ERJ6GEYJ101V	RES,M 100-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1822	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1823	ERJ6GEYJ473V	RES,M 47K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1825	ERJ6GEYJ471V	RES,M 470-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1827	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1828	ERJ6GEYJ471V	RES,M 470-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1830	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R1856	ERJ6GEYJ153V	RES,M 15K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R2106	ERJ6GEYJ183V	RES,M 18K-J-1/10W *CT-27D31E/CE/UE*
R2109	ERJ6GEYJ683V	RES,M 68K-J-1/10W *CT-27D31E/CE/UE*
R2110	ERJ6GEYJ331V	RES,M 330-J-1/10W *CT-27D31E/CE/UE*
R2111	ERJ6GEYJ152V	RES,M 1.5K-J-1/10W *CT-27D31E/CE/UE*
R2112	ERJ6GEYJ331V	RES,M 330-J-1/10W *CT-27D31E/CE/UE*

REF NO.	PART NO.	DESCRIPTION
R2113	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27D31E/CE/UE*
R2114	ERJ6GEYJ681V	RES,M 680-J-1/10W *CT-27D31E/CE/UE*
R2116	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27D31E/CE/UE*
R2117	ERJ6GEYJ121V	RES,M 120-J-1/10W *CT-27D31E/CE/UE*
R2118	EVND8AA03B14	CONTROL 10K *CT-27D31E/CE/UE*
R2119	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W *CT-27D31E/CE/UE*
R2121	ERJ6GEYJ221V	RES,M 220-J-1/10W *CT-27D31E/CE/UE*
R2122	ERJ6GEYJ473V	RES,M 47K-J-1/10W *CT-27D31E/CE/UE*
R2123	ERJ6GEYJ473V	RES,M 47K-J-1/10W *CT-27D31E/CE/UE*
R2124	ERJ6GEYJ332V	RES,M 3.3K-J-1/10W *CT-27D31E/CE/UE*
R2127	ERJ6GEYJ101V	RES,M 100-J-1/10W *CT-27D31E/CE/UE*
R2203	ERJ6GEYJ751V	RES,M 750-J-1/10W
R2206	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2207	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R2221	ERJ6GEYJ101V	RES,M 100-J-1/10W
R2301	ERQ2CJP2R2S	RES,F 2.2-J-2W
R2305	ERD25FJ180T	RES,C 18-J-1/4
R2306	ERD25FJ180T	RES,C 18-J-1/4
R2307	ERJ6GEYJ221V	RES,M 220-J-1/10W
R2308	ERJ6GEYJ221V	RES,M 220-J-1/10W
R2311	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R2312	ERJ6GEYJ752V	RES,M 7.5K-J-1/10W
R2313	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R2318	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R2319	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R2321	ERDS2TJ181T	RES,C 180-J-1/4W
R2322	ERDS2TJ181T	RES,C 180-J-1/4W
R2323	ERJ6GEYJ822V	RES,M 8.2K-J-1/10W
R2325	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2329	ERJ6GEYJ751V	RES,M 750-J-1/10W
R2330	ERJ6GEYJ183V	RES,M 18K-J-1/10W
R2332	ERJ6GEYJ751V	RES,M 750-J-1/10W
R2333	ERJ6GEYJ183V	RES,M 18K-J-1/10W
R2334	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R2336	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R2337	ERJ6GEYJ221V	RES,M 220-J-1/10W
R2338	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R2339	ERJ6GEYJ221V	RES,M 220-J-1/10W
R2340	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R2341	ERJ6GEYJ152V	RES,M 1.5K-J-1/10W
R2342	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R2343	ERJ6GEYJ152V	RES,M 1.5K-J-1/10W
R2344	ERJ6GEYJ471V	RES,M 470-J-1/10W
R2345	ERJ6GEYJ223V	RES,M 22K-J-1/10W
R2346	ERJ6GEYJ471V	RES,M 470-J-1/10W
R2350	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R2351	ERJ6GEYJ105V	RES,M 1M-J-1/10W
R2352	ERJ6GEYJ105V	RES,M 1M-J-1/10W
R2353	ERJ6GEYJ101V	RES,M 100-J-1/10W
R2355	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W
R2366	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W

REPLACEMENT PARTS LIST

Models: CT-27D11E/DE/UE, CT-27D21E/UE, CT-27D31E/CE/UE & CT-2772SE/SCE/SUE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
R2367	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R2418	ERJ6GEYJ471V	RES,M 470-J-1/10W
R2419	ERJ6GEYJ471V	RES,M 470-J-1/10W
R3001	ERJ6GEYJ101V	RES,M 100-J-1/10W
R3003	ERJ6GEYJ152V	RES,M 1.5K-J-1/10W
R3004	ERJ6GEYJ152V	RES,M 1.5K-J-1/10W
R3005	ERJ6GEYJ330V	RES,M 33-J-1/10W
R3006	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3007	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3008	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3009	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3010	ERJ6ENF75R0V	RES,M 75.0-F-1/10W
R3011	ERJ6ENF75R0V	RES,M 75.0-F-1/10W
R3012	ERJ6GEYJ750V	RES,M 75-J-1/10W
R3013	ERDS2TJ331T	RES,C 330-J-1/4W
R3014	ERJ6GEYJ330V	RES,M 33-J-1/10W
R3015	ERDS2TJ102T	RES,C 1K-J-1/4W
R3016	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3017	ERJ6GEYJ330V	RES,M 33-J-1/10W
R3018	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R3019	ERDS2TJ102T	RES,C 1K-J-1/4W
R3020	ERJ6GEYJ330V	RES,M 33-J-1/10W
R3021	ERJ6GEYJ471V	RES,M 470-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4310	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4311	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4326	ERD25VJ221T	RES,C 220-J-1/4 *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4327	ERJ6GEYJ331V	RES,M 330-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4328	ERJ6GEYJ560V	RES,M 56-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4329	ERJ6GEYJ182V	RES,M 1.8K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4330	ERJ6GEYJ561V	RES,M 560-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4331	ERJ6GEYJ391V	RES,M 390-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4332	ERJ6GEYJ393V	RES,M 39K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4333	ERJ6GEYJ304V	RES,M 300K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4334	ERJ6GEYJ152V	RES,M 1.5K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4336	ERJ6GEYJ680V	RES,M 68-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4338	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4339	ERJ6GEYJ102V	RES,M 1K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4340	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4341	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4342	ERJ6GEYJ223V	RES,M 22K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4344	ERJ6GEYJ682V	RES,M 6.8K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R4345	ERJ6GEYJ103V	RES,M 10K-J-1/10W *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
R6501	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6502	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6503	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6505	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6509	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6510	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6511	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R6512	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6513	ERJ6GEYJ152V	RES,M 1.5K-J-1/10W
R6515	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6516	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R6518	ERJ6GEYJ333V	RES,M 33K-J-1/10W
R6519	ERJ6GEYJ333V	RES,M 33K-J-1/10W
R6520	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6522	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6523	ERJ6GEYJ562V	RES,M 5.6K-J-1/10W
R6524	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6526	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6535	ERJ6GEYJ181V	RES,M 180-J-1/10W
R6537	ERJ6GEYJ392V	RES,M 3.9K-J-1/10W
R6538	ERJ6GEYJ122V	RES,M 1.2K-J-1/10W
R6540	ERJ6GEYJ151V	RES,M 150-J-1/10W
R6542	ERJ6GEYJ680V	RES,M 68-J-1/10W
R6543	ERJ6GEYJ122V	RES,M 1.2K-J-1/10W
R6544	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6545	ERJ6GEYJ221V	RES,M 220-J-1/10W
R6548	ERJ6GEYJ471V	RES,M 470-J-1/10W
R6549	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R6553	ERJ6GEYJ101V	RES,M 100-J-1/10W
R6554	ERJ6GEYJ472V	RES,M 4.7K-J-1/10W
R6555	ERJ6GEYJ153V	RES,M 15K-J-1/10W
R6556	ERJ6GEYJ333V	RES,M 33K-J-1/10W
R6557	ERJ6GEYJ123V	RES,M 12K-J-1/10W
R6558	ERJ6GEYJ103V	RES,M 10K-J-1/10W
R6559	ERJ6GEYJ272V	RES,M 2.7K-J-1/10W
R6560	ERJ6GEYJ124V	RES,M 120K-J-1/10W
R6565	ERJ6GEYJ102V	RES,M 1K-J-1/10W
R6566	ERJ6GEYJ681V	RES,M 680-J-1/10W
R6567	ERJ6GEYJ222V	RES,M 2.2K-J-1/10W
R6568	ERJ6GEYJ471V	RES,M 470-J-1/10W
		SWITCHES
S001	TSE2AD001	SWITCH, PUSH
S002	TSE2AD001	SWITCH, PUSH
S003	TSE2AD001	SWITCH, PUSH

REPLACEMENT PARTS LIST

Models: CT-27D11E/DE/UE, CT-27D21E/UE, CT-27D31E/CE/UE & CT-2772SE/SCE/SUE

Important Safety Notice: Components printed in **BOLD TYPE** have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.

REF NO.	PART NO.	DESCRIPTION
S004	TSE2AD001	SWITCH, PUSH
S005	TSE2AD001	SWITCH, PUSH
S008	TSE2AD001	SWITCH, PUSH
S009	TSE2AD001	SWITCH, PUSH
	TRANSFORMERS	
T001	**TLP16297**	**TRANSFORMER, POWER SUPPLY**
T501	**TLH15452**	**TRANSFORMER, HORIZONTAL DRIVER**
T502	**ETE19Z30AY**	**TRANSFORMER, HORIZONTAL COUPLING**
T551	**TLF2AA002**	**TRANSFORMER, FLYBACK**
T801	**ETS29AK3L5NC**	**TRANSFORMER, SWITCHING**
	CRYSTALS/FILTERS	
X001	TSSA092	CRYSTAL OSCILLATOR
X501	TSS2AA001	CRYSTAL, 3.58MHZ
X601	TAFCSB503F30	CRYSTAL
X1801	TSSA092	CRYSTAL OSCILLATOR *CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
X2102	EFCS4R5MW5BA	FILTER, BANDPASS *CT-27D31E/CE/UE*
X2103	M1972M	FILTER *CT-27D31E/CE/UE*
	OTHERS	
TNR001	**ENGF6101G**	**TUNER *CT-27D31E/CE/UE***
TNR001	**ENG36604G**	**TUNER *CT-27D11E/UE CT-27D21E/UE CT-2772SE/SCE/SUE***
TNR002	**ENV56D61G3**	**TUNER *CT-27D31E/CE/UE***
M001	EUR511502	REMOTE CONTROL *CT-27D11E/UE*
M002	EUR511500	REMOTE CONTROL *CT-27D31E/CE/UE*
M003	EUR511501	REMOTE CONTROL *CT-27D21E/UE*
M004	EUR511511	REMOTE CONTROL *CT-2772SE/SCE/SUE*
M005	UR51EC975A	BATTERY COVER, REMOTE CONTROL *CT-27D11E/UE CT-27D21E/UE CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
M006	**TSX2AA0112**	**LINE CORD**
M007	TMW2A97121	STRAIN RELIEF: AC LINE CORD *CT-27D11E/UE CT-27D21E CT-27D31E/CE/UE CT-2772SE/SCE/SUE*
M008	**M68LGL061X**	**CRT 27"**

REF NO.	PART NO.	DESCRIPTION
M009	**TJS2AC00301**	**SOCKET, CRT *CT-2772SE/SCE/SUE***
DY	**TLY2AA006**	**DEFLECTION YOKE**
M010	JH291U-009	CONVERGENCE YOKE
DEG	**TLK2AA0011**	**COIL, DEGAUSSING *CT-27D11E/UE CT-27D31E/CE/UE***
DEG	**TSP2AA006**	**COIL, DEGAUSSING 27" *CT-27D21E/UE CT-2772SE/SUE***
DEG	**TSP2AA017**	**COIL, DEGAUSSING *CT-2772SCE***
M011	TXF3A011EV	ASSY., DAG GND
M012	TMM2A30702	WEDGE, YOKE
M013	0FMK014ZZ	CONVERGENCE CORRECTOR STRIP
M014	TXFKU01ESER	ASSY, CABINET BACK *CT-27D11E/UE CT-27D21E/UE CT-27D31E/CE/UE*
M015	TXFKY01ESER	ASSY, CABINET FRONT *CT-27D11E/UE CT-27D21E/UE CT-27D31E/CE/UE*
M016	TXFKY02ESER	ASSY, CABINET FRONT *CT-2772SE/SCE/SUE*
M017	TAS2AA0015	SPEAKER 8-OHM 5W
M018	TBM2A10141	BADGE PANASONIC
M019	TBM2A52517-2	NAMEPLATE, MODEL *CT-27D11E/UE CT-27D21E/UE CT-27D31E/CE/UE*
M020	TBX2AA1701GS	7-KEY BUTTON *CT-2772SE/SCE/SUE*
M021	TXANV01ESER	7-KEY BUTTON *CT-27D11E/UE CT-27D21E/UE CT-27D31E/CE/UE*
JK3001	TJB2AA0221	TERMINAL, A/V 8P
JK3002	TJB2AA0046	TERMINAL, FRONT A/V
JK3003	TJB2AA0171	TERMINAL, S-VHS
JK3004	TJB2AA0211-1	TERMINAL, A/V 2P
M022	TQB2AA0373	MANUAL, OWNERS *CT-27D11E/UE CT-27D21E/UE CT-27D31E/UE CT-2772SE/SUE*
M023	TQB2AA0398	MANUAL, OWNERS *CT-27D31CE CT-2772SCE*
M024	TQB2AA7058	REMOTE GUIDE *CT-27D11E/UE*
M025	TQB2AA7059	REMOTE GUIDE *CT-27D21E/UE*
M026	TQB2AA7060	REMOTE GUIDE *CT-27D31E/CE/UE*
M027	TQB2AA7062	REMOTE GUIDE *CT-2772SE/SCE/SUE*
M028	TQB2AA7078	V-CHIP NA8

DESCRIPTION OF ABBREVIATIONS GUIDE

RESISTOR

TYPE		TOLERANCE	
C	Carbon	F	+/- 1%
F	Fuse	J	+/- 5%
M	Metal Oxide	K	+/- 10%
S	Solid	M	+/- 20%
W	Wire Wound	G	+/- 2%

RES, C 270-J-1/4

CAPACITOR

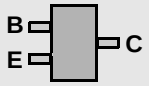
TYPE		TOLERANCE	
C	Ceramic	C	+/- 0.25pF
E	Electrolytic	D	+/- 0.5pF
P	Polyester	F	+/- 1pF
S	Styrol	J	+/- 5%
T	Tantalum	K	+/- 10%
		L	+/- 15%
		M	+/- 20%
		P	+10% -0%
		Z	+80% -20%

CAP, P .068UF-K-50V

IMPORTANT SAFETY NOTICE

THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

CHIP TRANSISTOR LEAD DESIGNATION



SCHEMATIC NOTES

1. Resistors are carbon 1/4W unless noted otherwise.
2. Capacitors are ceramic 50V unless noted otherwise.
3. Coil value notes is inductance in μH.
4. Test point indicated by ; Test point but no pin .
5. Components indicated with ⚠ are critical parts and replacement should be made with manufacture specified replacement parts only.
6. ▬▬ (**BOLD LINE**) indicates the route of B+ supply.
7. The schematic diagrams are current at the time of printing and are subject to change without notice.
8. Ground symbol ⏚ indicates **HOT GROUND CONNECTION**; ⏚ indicates COLD GROUND.

NOTE: All other component symbols are used for engineering design purposes.

VOLTAGE MEASUREMENTS

1. Voltage measurement:
   - AC input to the Receiver is 120V. NTSC (HD, 1125i & 525P when applicable) signal generator is connected to the antenna of the Receiver. (Color bar pattern of 100 IRE white and 7.5 IRE black.)
   - All Picture and Audio adjustments are set to Normalize.
     TV ANT/CABLE - (Set-Up Menu) in TV/ANT Mode
     Volume - Min.
     TV/Video SW - TV position
     Audio Mode - Stereo
   - Voltage readings are nominal and may vary ±10% on active devices. Some voltage reading will vary with signal strength and picture content.
   - Supply voltages are nominal.
2. Ground symbol ⏚ indicates ground lead connection of meter.
   Incorrect ground connection will result in erroneous readings.

CAUTION: ***Incorrect ground connection of the test equipment will result in erroneous readings.***

WAVEFORM MEASUREMENTS

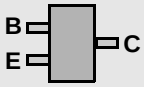
1. ③ indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to “MIN”.
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

NOTA DE SEGURIDAD

LOS DIAGRAMAS ELÉCTRICOS INCLUYEN CARACTERÍSTICAS ESPECIALES MUY IMPORTANTES PARA LA PROTECCIÓN CONTRA RAYOS-X, QUEMADURAS Y DESCARGAS ELÉCTRICAS. CUANDO SE DE SERVICIO ES IMPORTANTE USAR PARA REEMPLAZO DE COMPONENTES CRITICOS, SOLO PARTES ESPECIFICADAS POR EL FABRICANTES. LOS COMPONENTES CRITICOS ESTAN SEÑALADOS EN LOS DIAGRAMAS POR EL SIMBOLO ⚠.

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



NOTAS DE LOS DIAGRAMAS

1. Las Resistencias son de Carbón de 1/4W, a menos que se indique otra característica.
2. Los Capacitores son de Cerámica para 50V, a menos que se indique otra característica.
3. El valor indicado de las Bobinas es la inductancia expresada en µH.
4. Los puntos de prueba en la terminal de algún componente son indicados por ● Los puntos de prueba fuera de los componentes se indican con ○.
5. Los componentes señalados con el símbolo ⚠ son considerados componentes críticos y deben ser reemplazados sólo con las partes especificadas por el fabricante.
6. ▬ (**LINEA GRUESA**) indica las líneas de alimentación de los Voltajes B+.
7. Los diagramas eléctricos están sujetos a cambio sin previo aviso.
8. El símbolo ⏚ indica que es una conexión a **Tierra Caliente** y el símbolo ⏚ indica conexión a **Tierra Fría**.

NOTA: Los demas símbolos de componentes incluidos son usados con fines de diseño.

MEDICIÓN DE VOLTAJES

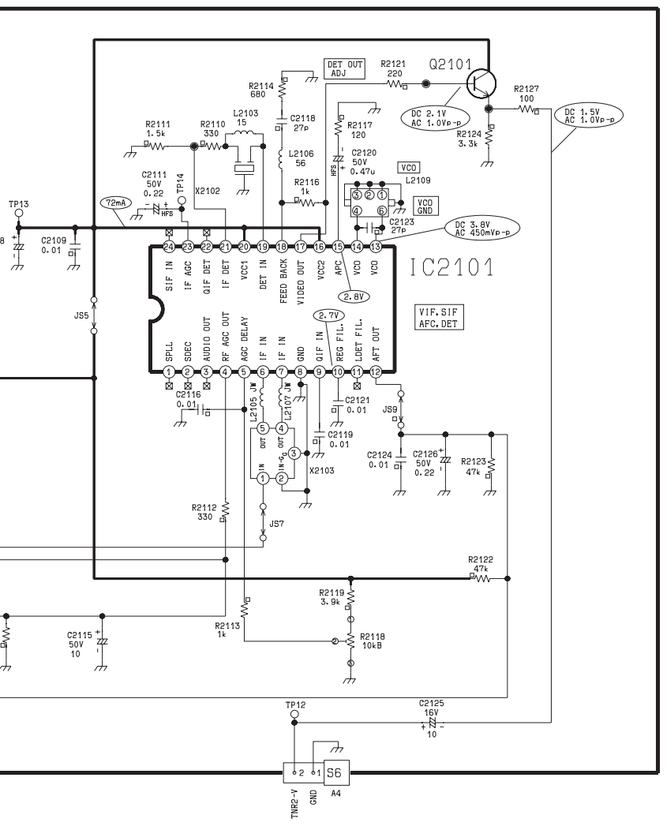
1. Medición de voltaje:
   - El voltaje de entrada al Receptor es de 120V de Corriente Alterna. Un generador de patrones con formato NTSC se conecta a la entrada de la antena. (Patrón de Barras de Colores con 100 IREs para el Blanco y 7.5 IREs para el Negro.)
   - Los ajustes de los Menus Picture y Audio se normalizan.
     En el Menú Set-Up, en la opción ANTENA, se selecciona el modo de CABLE.
     El nivel de Volumen se minimiza.
     De los modos TV y Video, seleccionar el modo TV.
     Seleccionar modo Estereo del Audio.
   - Las mediciones de los voltajes son nominales y pueden variar hasta 10% en componentes en funcionamiento. Las lecturas de los voltajes pueden variar por la potencia de la señal y el contenido de la imagen.
   - Las fuentes de voltajes son nominales.
2. El símbolo ⏚ indica el tipo de tierra que se utiliza en la conexión del medidor.

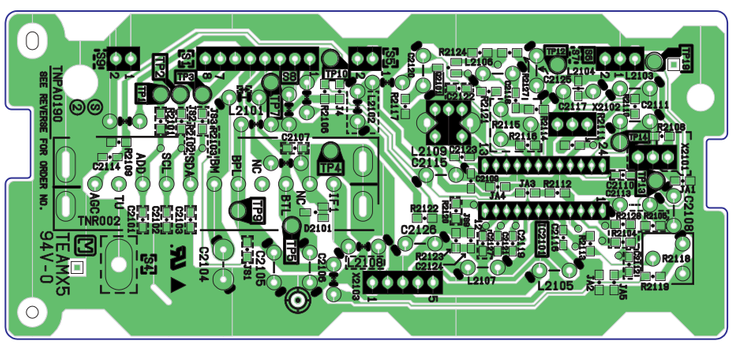
PRECAUCION: SI no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.

MEDICIÓN DE FORMAS DE ONDA

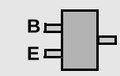
1. Un símbolo como ③ indica el punto para medir una señal. (La medición puede hacerse en el punto con mayor accesibilidad, siempre que sea común al indicado.)
2. Se midieron utilizando un generador con formato NTSC conectado a la terminal de la antena. (Patrón de 8 Barras de Colores EAI, formato NTSC de 100 IREs para el Blanco y 7.5 IREs para el Negro.)
3. Los ajustes de usuario de los Menus PICTURE y AUDIO se normalizaron. Posteriormente el nivel de volumen se ajusta al mínimo.
4. Las formas de onda de Video y Color fueron tomadas con un osciloscopio de banda alta y con un punta de prueba de baja capacitancia (10 a 1). La forma y amplitud de las ondas puede variar según el tipo de osciloscopio que se utilice y sus características.
5. El símbolo de tierra ⏚ que aparece junto al número de la forma de onda, indica que se utiliza conexión a **Tierra Caliente** en el extremo negativo de la punta de prueba.

PRECAUCION: Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.

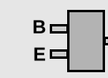




CHIP TRANSISTOR LEAD DESIGNATION



IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



IC2101				Q2101	
1	n.c	13	3.38	B	1.81
2	n.c	14	3.38	C	4.72
3	n.c	15	2.85	E	1.21
4	1.52	16	4.72		
5	2.37	17	1.81		
6	2.51	18	1.86		
7	2.51	19	1.71		
8	GND	20	4.72		
9	2.50	21	1.71		
10	1.21	22	n.c		
11	n.c	23	2.36		
12	2.68	24	n.c		

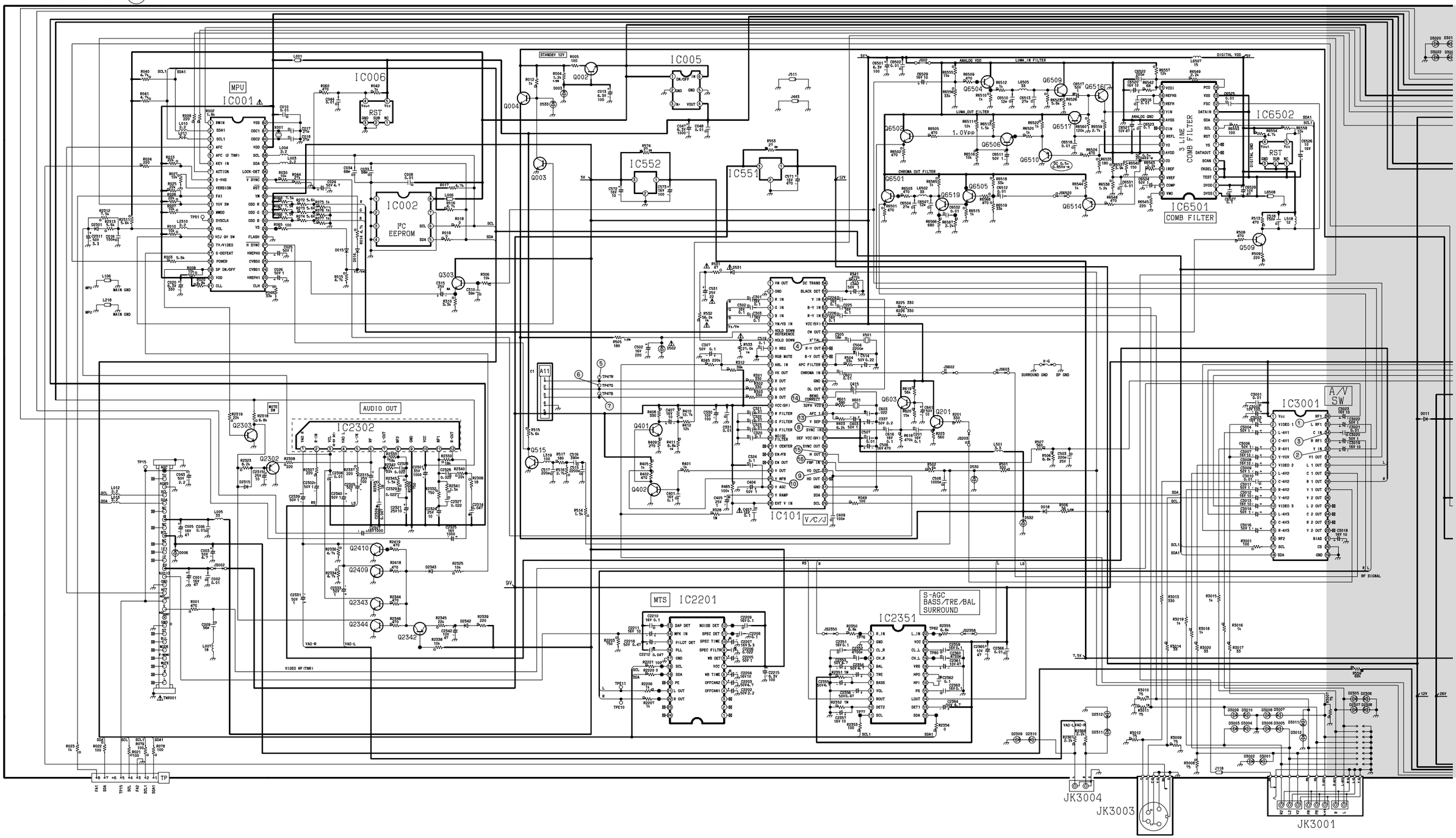
Notas:

- Verifique los números de parte de los componentes y sus valores en la lista de partes.
- La medición de los voltajes se hizo con un Voltímetro Digital.

A-BOARD -- TARJETA A
CT-27D11E/DE/UE

A-BOARD SCHEMATIC LEFT PORTION -- DIAGRAMA ELÉCTRICO TARJETA A SECCIÓN IZQUIERDA

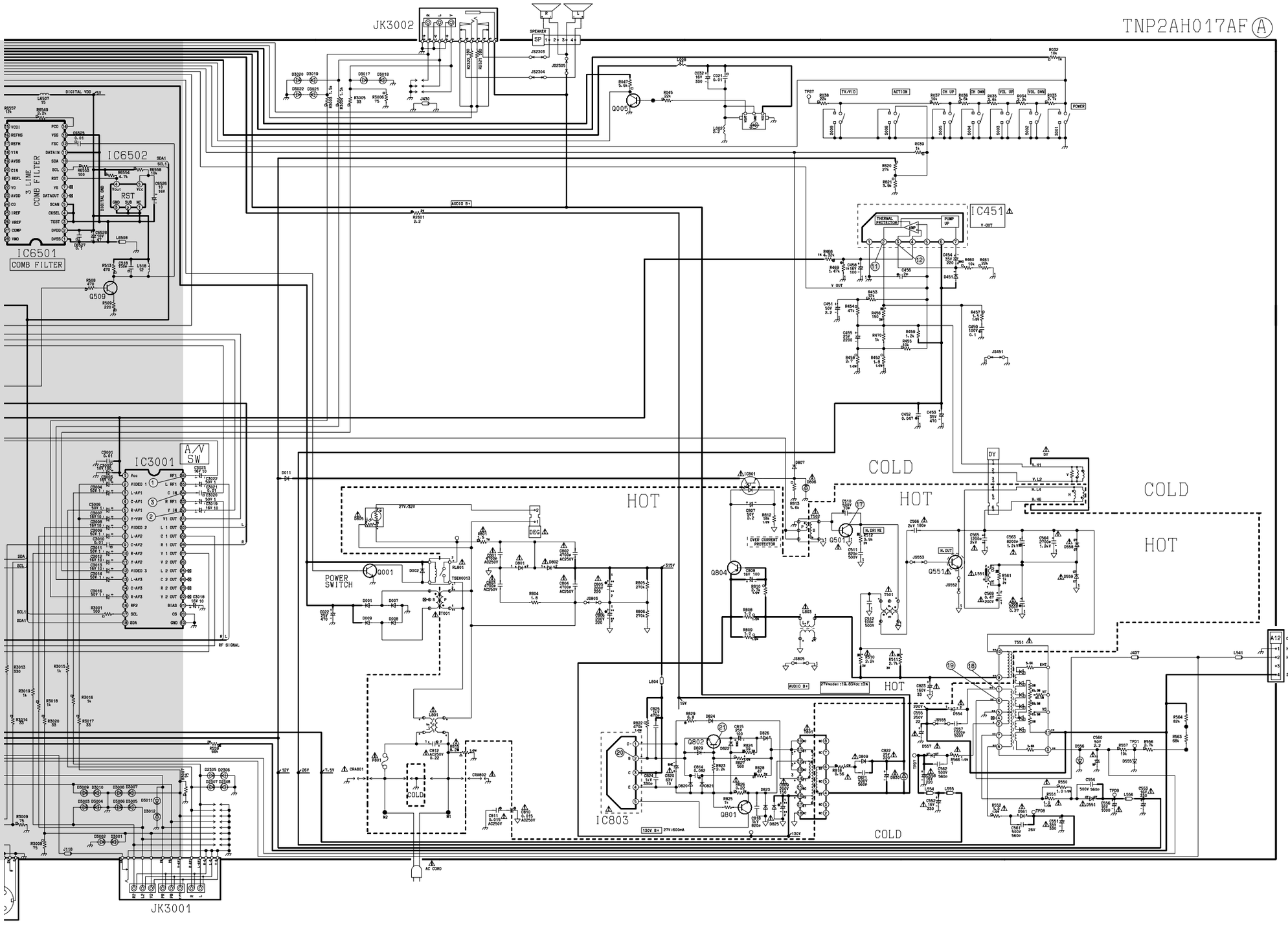
TNP2AH017AF Ⓐ



A-BOARD SCHEMATIC RIGHT PORTION -- DIAGRAMA ELÉCTRICO TARJETA A SECCIÓN DERECHA

A-BOARD -- TARJETA A
CT-27D11E/DE/UE

TNP2AH017AF (A)



CHIP TRANSISTOR LEAD DESIGNATION

B
E
C

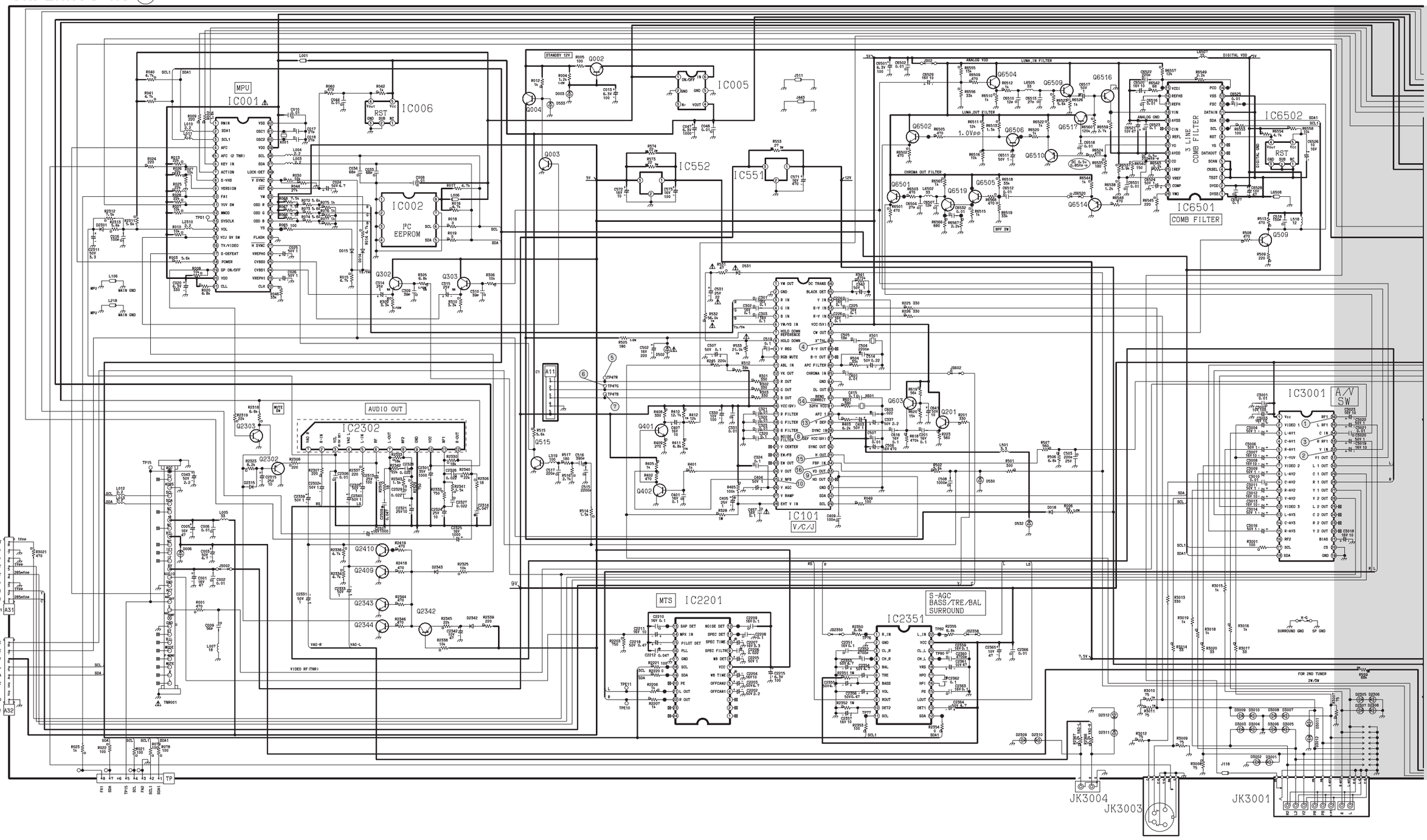
IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*

B
E
C

A-BOARD - TARJETA A
CT-27D21E/UE & CT-2772SE/SCE/SUE

A-BOARD SCHEMATIC LEFT PORTION -- DIAGRAMA ELÉCTRICO TARJETA A SECCIÓN IZQUIERDA

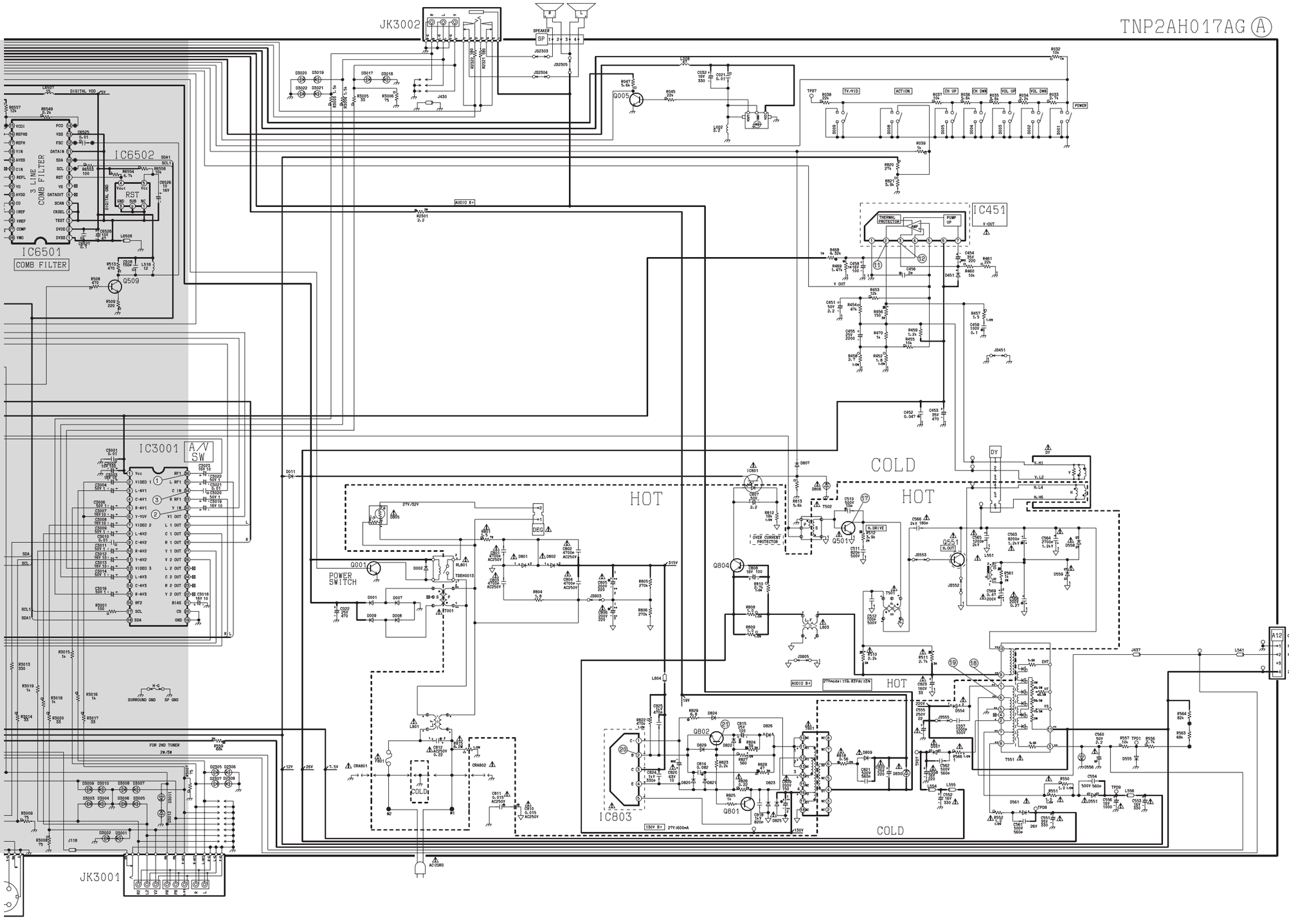
TNP2AH017AG Ⓐ



A-BOARD SCHEMATIC RIGHT PORTION -- DIAGRAMA ELÉCTRICO TARJETA A SECCIÓN DERECHA

A-BOARD -- TARJETA A
CT-27D21E/UE & CT-2772SE/SCE/SUE

TNP2AH017AG Ⓐ



CHIP TRANSISTOR LEAD DESIGNATION

B
E
C

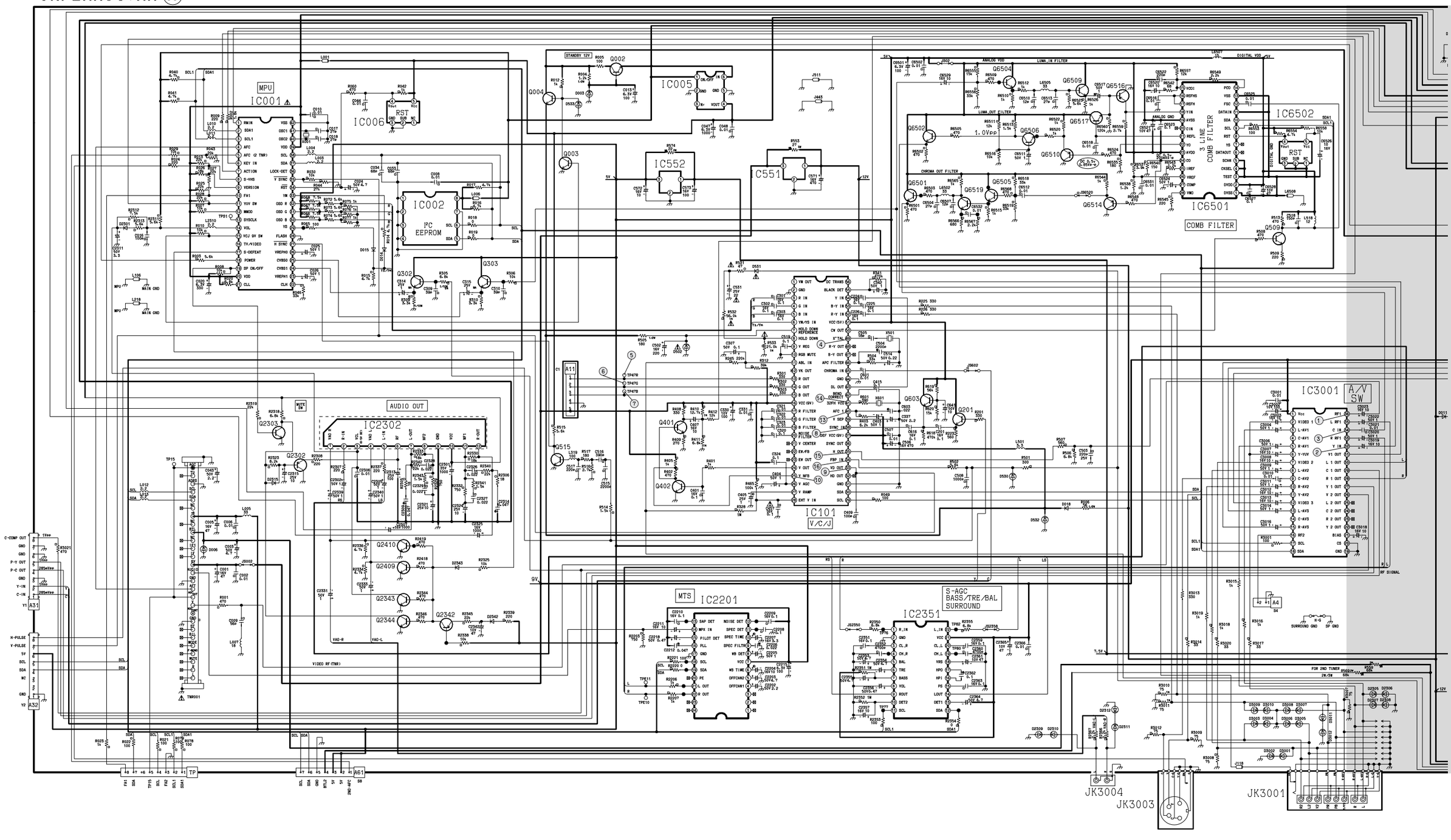
IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*

B
E
C

A-BOARD -- TARJETA A
CT-27D31E/CE/UE

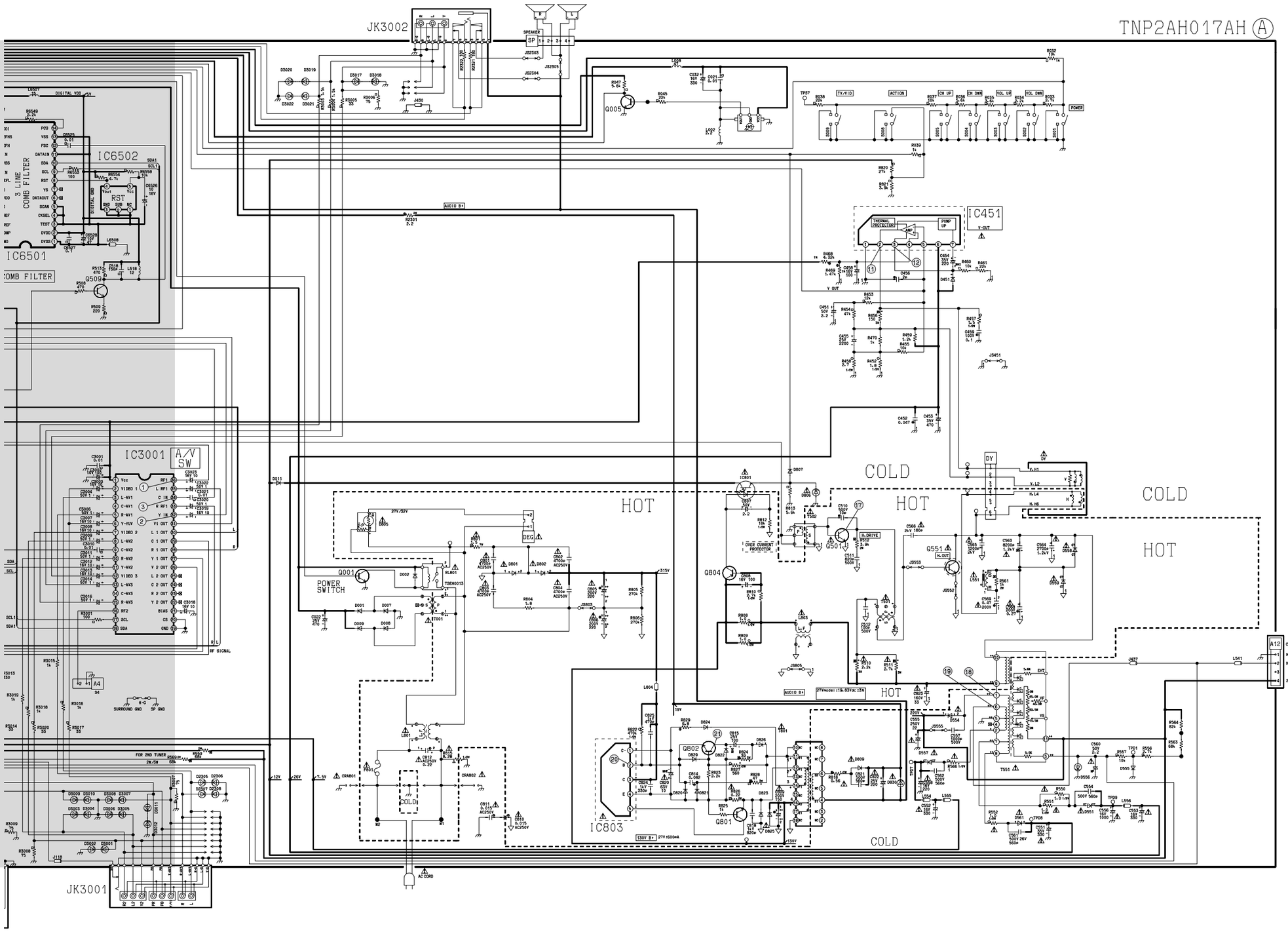
A-BOARD SCHEMATIC LEFT PORTION -- DIAGRAMA ELÉCTRICO TARJETA A SECCIÓN IZQUIERDA

TNP2AH017AH Ⓐ



A-BOARD SCHEMATIC RIGHT PORTION -- DIAGRAMA ELÉCTRICO TARJETA A SECCIÓN DERECHA

A-BOARD -- TARJETA A
CT-27D31E/CE/UE



CHIP TRANSISTOR LEAD DESIGNATION

B
E
C

IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*

B
E
C

A-BOARD -- TARJETA A
ALL MODELS -- TODOS LOS MODELOS

A-BOARD VOLTAGES -- VOLTAJES TARJETA A

IC001

1	0.00	22	2.05
2	4.70	23	2.43
3	4.80	24	1.52
4	1.82	25	1.55
5	n.c	26	2.41
6	3.27	27	2.93
7	1.62	28	GND
8	3.27	29	0.06
9	1.80	30	0.11
10	3.27	31	0.11
11	0.00	32	0.11
12	3.28	33	0.00
13	1.65	34	3.28
14	0.10	35	3.16
15	0.10	36	n.c
16	n.c	37	3.30
17	0.00	38	3.20
18	3.18	39	3.28
19	0.00	40	1.60
20	3.28	41	1.60
21	1.52	42	GND

IC101

1	n.c	29	3.20
2	GND	30	3.20
3	3.37	31	GND
4	3.35	32	n.c
5	3.35	33	4.40
6	0.00	34	1.00
7	6.20	35	1.70
8	5.20	36	n.c
9	5.20	37	9.00
10	GND	38	3.10
11	5.70	39	6.30
12	n.c	40	7.60
13	2.50	41	6.00
14	2.50	42	4.80
15	2.50	43	1.10
16	8.80	44	GND
17	4.70	45	1.70
18	4.50	46	1.50
19	4.40	47	n.c
20	2.90	48	n.c
21	n.c	49	3.86
22	n.c	50	3.20
23	n.c	51	4.80
24	0.60	52	2.90
25	5.20	53	2.90
26	2.00	54	3.70
27	4.30	55	3.00
28	5.50	56	n.c

IC002

1	GND
2	GND
3	GND
4	GND
5	3.26
6	3.17
7	GND
8	4.96

IC003

1	4.96
2	GND
3	2.69

IC005

1	4.96
2	GND
3	n.c
4	3.29
5	GND
6	4.96

IC006

1	n.c
2	GND
3	GND
4	3.29
5	3.29

IC451

1	GND
2	12.16
3	26.96
4	2.25
5	2.24
6	26.23
7	3.06

IC551

1	13.27
2	GND
3	8.80

IC552

1	8.14
2	GND
3	4.80

IC801

1 ⏚	0.50
2 ⏚	0.00
3	0.00
4	12.70

IC803 ⏚

1	88.00
2	131.00
3	354.00
4	131.00
5	131.00

IC2201

1	n.c
2	n.c
3	n.c
4	2.17
5	2.18
6	0.30
7	4.73
8	2.28
9	2.30
10	0.40
11	2.17
12	3.05
13	3.21
14	2.18
15	3.17
16	3.26
17	GND
18	3.20
19	3.25
20	n.c
21	2.20
22	2.20
23	n.c
24	n.c

IC2302

1	6.20
2	6.80
3	0.10
4	6.10
5	6.80
6	18.40
7	11.10
8	11.30
9	GND
10	24.10
11	11.40
12	11.20

IC3001

1	8.80	19	GND
2	3.50	20	GND
3	4.50	21	4.00
4	n.c	22	n.c
5	4.50	23	n.c
6	3.50	24	n.c
7	3.50	25	n.c
8	4.50	26	3.70
9	4.50	27	3.30
10	4.50	28	3.90
11	3.50	29	3.90
12	3.50	30	3.90
13	4.50	31	3.70
14	n.c	32	3.90
15	4.50	33	4.50
16	n.c	34	4.50
17	4.80	35	4.50
18	4.80	36	3.50

IC2351

1	3.94	12	4.80
2	GND	13	5.59
3	4.38	14	4.17
4	4.37	15	4.36
5	4.40	16	7.87
6	4.36	17	4.37
7	4.45	18	4.37
8	5.45	19	4.37
9	4.11	20	4.39
10	1.76	21	8.84
11	4.80	22	3.94

IC6501

1	GND	15	2.64
2	4.70	16	3.32
3	GND	17	3.32
4	GND	18	2.24
5	GND	19	GND
6	n.c	20	n.c
7	n.c	21	1.40
8	4.72	22	0.40
9	4.80	23	4.76
10	4.80	24	0.40
11	GND	25	1.12
12	2.33	26	1.13
13	GND	27	3.45
14	2.26	28	0.50

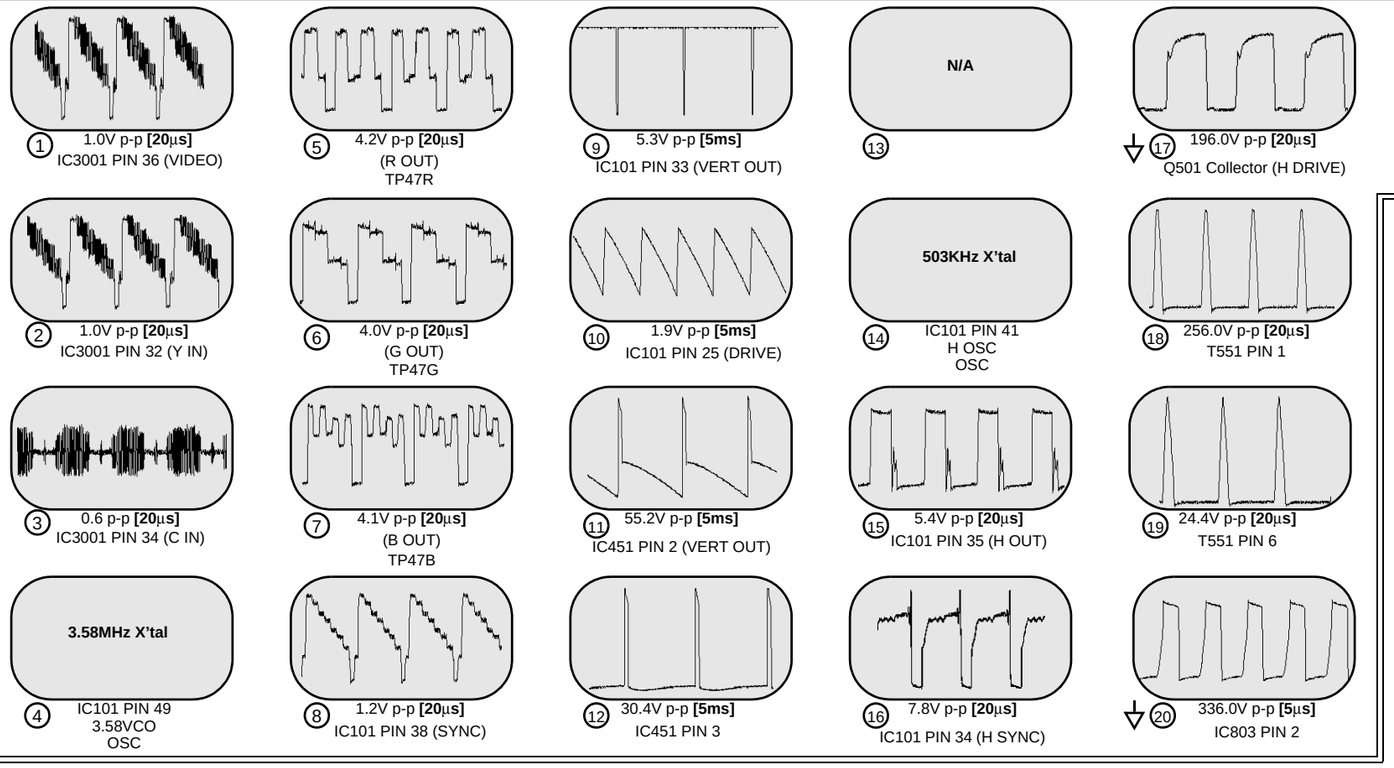
	Q001	Q002	Q003	Q004	Q005	Q201	Q302	Q303	Q401
B	0.80	6.00	0.09	10.11	0.60	3.50	4.95	3.42	4.94
C	0.20	7.00	9.17	12.31	0.04	5.40	4.82	4.86	4.88
E	GND	5.01	GND	9.80	GND	2.72	4.29	2.81	4.30

	Q402	Q501 ⏚	Q509	Q515	Q551 ⏚	Q603	Q801 ⏚	Q802 ⏚	Q804 ⏚
B	0.60	0.00	3.19	0.00	0.00	1.02	130.00	130.00	130.80
C	3.50	88.00	4.71	2.99	-40.00	4.78	130.40	130.00	0.00
E	GND	GND	2.50	GND	GND	1.17	130.00	130.00	130.50

	Q2302	Q2303	Q2342	Q2343	Q2344	Q2409	Q2410	Q6501	Q6502
B	23.80	0.00	5.00	0.27	0.27	0.27	0.27	3.20	3.50
C	GND	23.40	0.00	0.02	0.24	0.00	0.00	5.01	4.50
E	19.01	GND	4.70	0.00	0.00	GND	GND	2.48	2.18

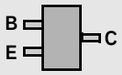
	Q6504	Q6505	Q6506	Q6509	Q6510	Q6514	Q6516	Q6517	Q6519
B	3.51	2.40	2.34	2.18	0.50	0.42	2.12	1.51	1.28
C	5.00	5.00	3.40	5.00	GND	GND	GND	5.00	3.01
E	2.70	2.40	2.00	1.70	1.00	0.98	2.76	1.12	1.32

A-BOARD WAVEFORMS -- FORMAS DE ONDA TARJETA A

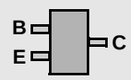

1 1.0V p-p [20µs] IC3001 PIN 36 (VIDEO)
5 4.2V p-p [20µs] (R OUT) TP47R
9 5.3V p-p [5ms] IC101 PIN 33 (VERT OUT)
13 N/A
17 196.0V p-p [20µs] Q501 Collector (H DRIVE)
21 340.0V p-p [5µs] Q802 Collector
2 1.0V p-p [20µs] IC3001 PIN 32 (Y IN)
6 4.0V p-p [20µs] (G OUT) TP47G
10 1.9V p-p [5ms] IC101 PIN 25 (DRIVE)
14 503KHz X'tal IC101 PIN 41 H OSC OSC
18 256.0V p-p [20µs] T551 PIN 1
3 0.6 p-p [20µs] IC3001 PIN 34 (C IN)
7 4.1V p-p [20µs] (B OUT) TP47B
11 55.2V p-p [5ms] IC451 PIN 2 (VERT OUT)
15 5.4V p-p [20µs] IC101 PIN 35 (H OUT)
19 24.4V p-p [20µs] T551 PIN 6
4 3.58MHz X'tal IC101 PIN 49 3.58VCO OSC
8 1.2V p-p [20µs] IC101 PIN 38 (SYNC)
12 30.4V p-p [5ms] IC451 PIN 3
16 7.8V p-p [20µs] IC101 PIN 34 (H SYNC)
20 336.0V p-p [5µs] IC803 PIN 2

WAVEFORMS -- FORMAS DE ONDA
ALL MODELS - TODOS LOS MODELOS

CHIP TRANSISTOR LEAD DESIGNATION



IDENTIFICACIÓN DE TERMINALES PARA TRANSISTORES EN *CHIP*



Medición de Formas de Onda

1. Un símbolo como (3) indica el punto para medir una señal. (La medición puede hacerse en el punto con mayor accesibilidad, siempre que sea común al indicado.)
2. Se midieron utilizando un generador con formato NTSC conectado a la terminal de la antena. (Patrón de 8 Barras de Colores EAI, formato NTSC de 100 IREs para el Blanco y 7.5 IREs para el Negro.)
3. Los ajustes de usuario de los Menus PICTURE y AUDIO se normalizaron. Posteriormente el nivel de volumen se ajusta al mínimo.
4. Las formas de onda de Video y Color fueron tomadas con un osciloscopio de banda alta y con un punta de prueba de baja capacitancia (10 a 1). La forma y amplitud de las ondas puede variar según el tipo de osciloscopio que se utilice y sus características.
5. El símbolo de tierra ⏚ que aparece junto al número de la forma de onda, indica que se utiliza conexión a **Tierra Caliente** en el extremo negativo de la punta de prueba.

PRECAUCION: Si no se utiliza la conexión a la tierra adecuada, se obtendrán mediciones equivocadas y podría dañar el equipo de medición.

Waveform Measurements

1. (3) indicates waveform measurement. (Measurement can be taken at the best accessible location in common to the indicated point.)
2. Taken with an NTSC signal generator connected to the antenna terminal. (NTSC color bar pattern of 8 bars of EIA colors, 100 IRE white and 7.5 IRE black.)
3. Customer Controls (Picture/Audio Menu) are set to Normalize. Volume is set to "MIN".
4. All video and color waveforms are taken with a wideband scope and a probe with low capacitance (10 to 1). Shape and peak altitudes may vary depending on the type of Oscilloscope used and its settings.
5. Ground symbol ⏚ shown on waveform number indicates (Hot) ground lead connection of the Oscilloscope.

CAUTION: Incorrect ground connection of the test equipment will result in erroneous readings.

NOTA DE SEGURIDAD

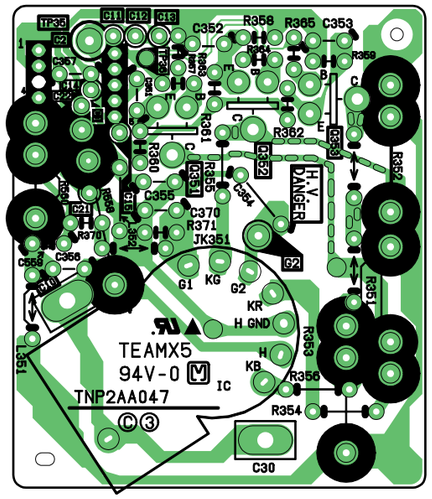
LOS DIAGRAMAS ELÉCTRICOS INCLUYEN CARACTERÍSTICAS ESPECIALES MUY IMPORTANTES PARA LA PROTECCIÓN CONTRA RAYOS-X, QUEMADURAS Y DESCARGAS ELÉCTRICAS. CUANDO SE DE SERVICIO ES IMPORTANTE USAR PARA REEMPLAZO DE COMPONENTES CRITICOS, SOLO PARTES ESPECIFICADAS POR EL FABRICANTES. LOS COMPONENTES CRITICOS ESTAN SEÑALADOS EN LOS DIAGRAMAS POR EL SIMBOLO ⚠.

IMPORTANT SAFETY NOTICE

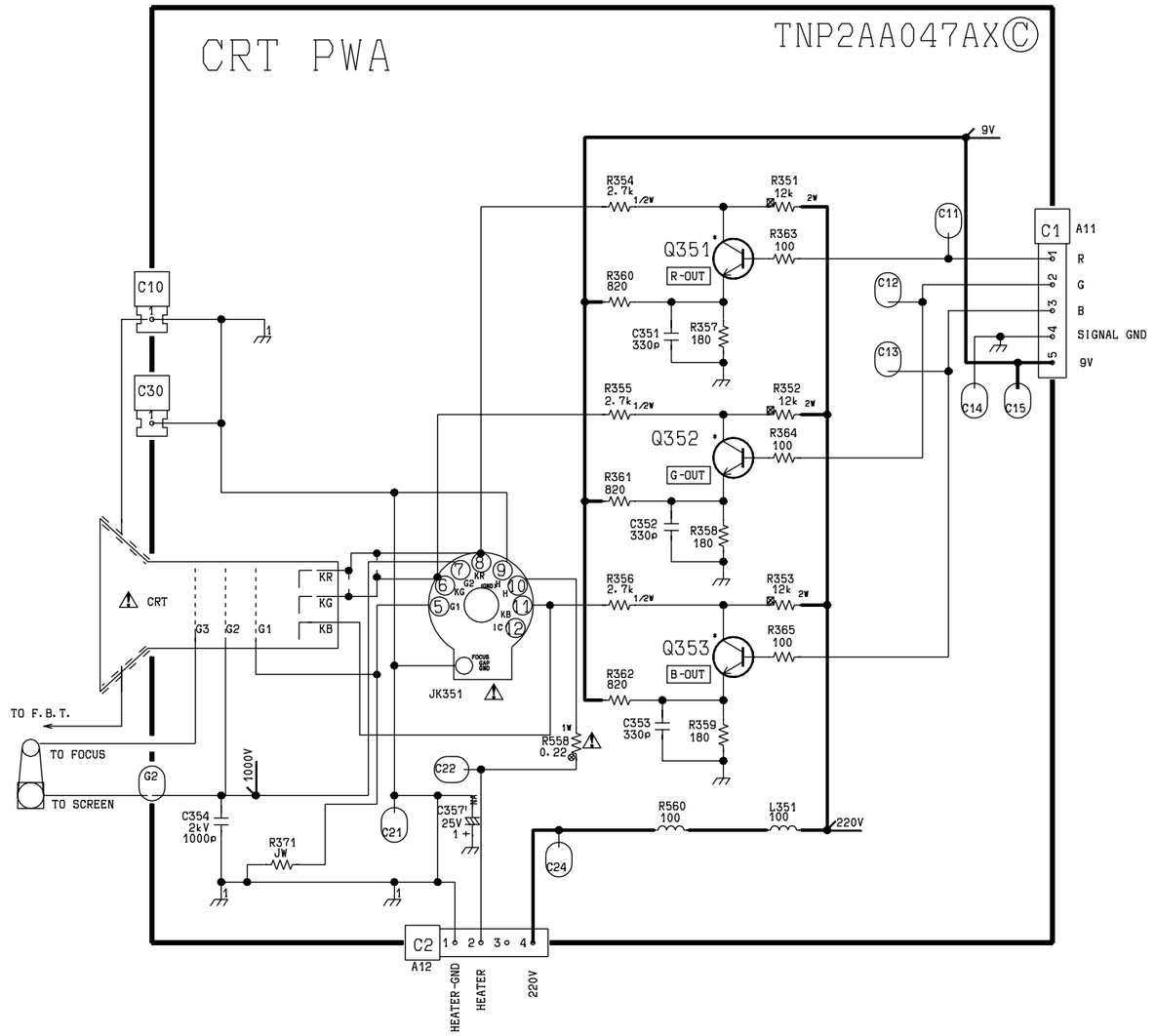
THIS SCHEMATIC DIAGRAM INCORPORATES SPECIAL FEATURES THAT ARE IMPORTANT FOR PROTECTION FROM X-RADIATION, FIRE AND ELECTRICAL SHOCK HAZARDS. WHEN SERVICING IT IS ESSENTIAL THAT ONLY MANUFACTURERS SPECIFIED PARTS BE USED FOR THE CRITICAL COMPONENTS DESIGNATED WITH A ⚠ IN THE SCHEMATIC.

C-BOARD -- TARJETA C
ALL MODELS -- TODOS LOS MODELOS

C-BOARD SCHEMATIC, LAYOUT & VOLTAGES -- DIAGRAMA ELÉCTRICO, CIRCUITO IMPRESO Y VOLTAJES TARJETA C



	Q351	Q352	Q353
B	2.75	2.68	2.70
C	130.40	135.10	134.80
E	2.61	2.53	2.57



Notas:

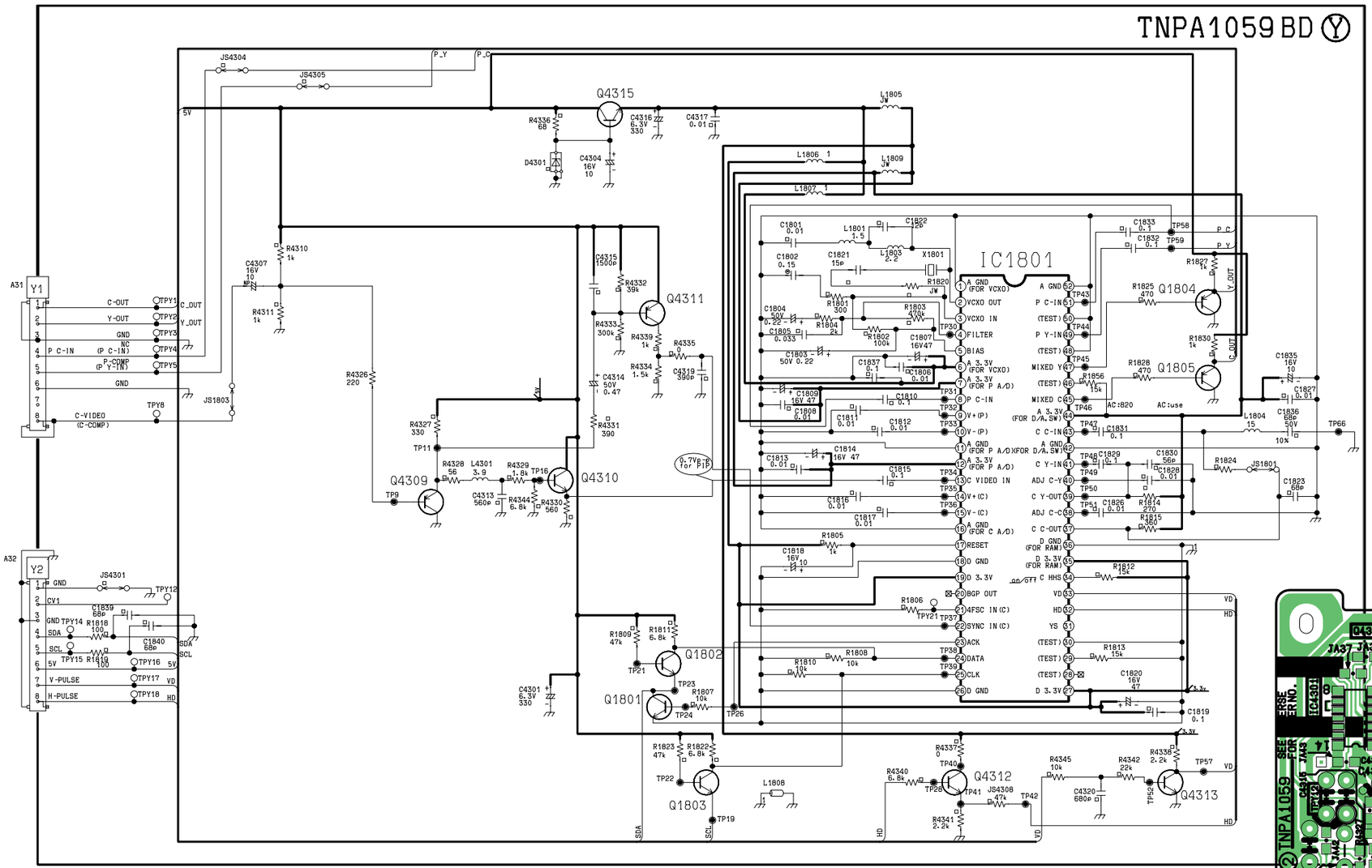
- Verifique los números de parte de los componentes y sus valores en la lista de partes.
- La medición de los voltajes se hizo con un Voltímetro Digital.

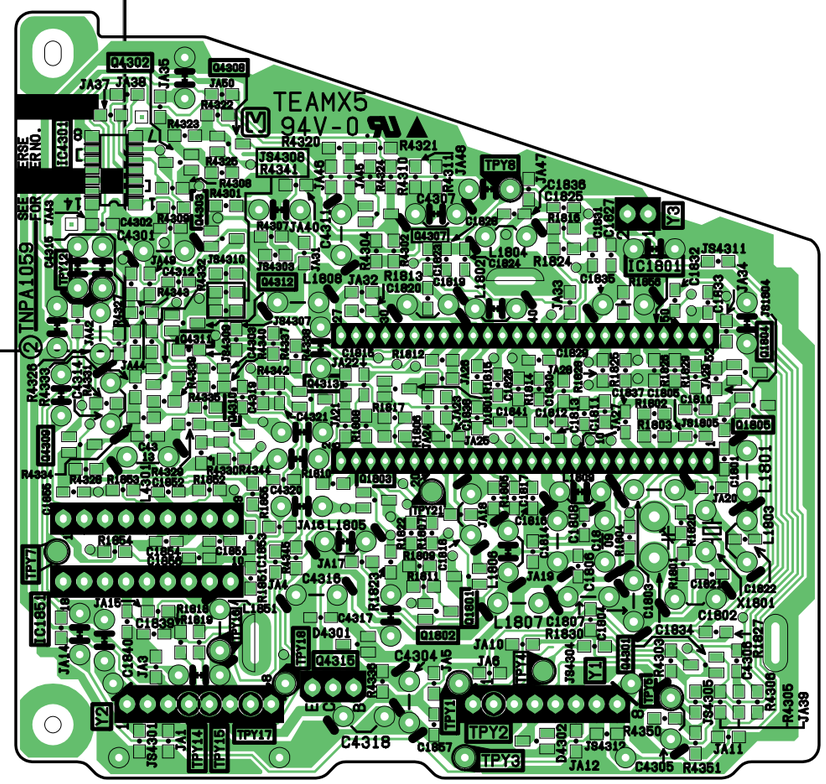
Notes:

- Check Parts List for most recent component values and part numbers.
- Obtain voltages with a digital multimeter.
- The board layouts were modified to enhance and display traces otherwise hidden by a mask.

Y-BOARD SCHEMATIC, LAYOUT & VOLTAGES
DIAGRAMA ELÉCTRICO, CIRCUITO IMPRESO Y VOLTAJES TARJETA Y

Y-BOARD - TARJETA Y
CT-27D21E/UE, CT-27D31E/CE/UE & CT-2772SE/SCE/SUE





IC1801			
1	GND	27	3.25
2	1.47	28	n.c
3	1.59	29	0.00
4	1.52	30	GND
5	1.61	31	n.c
6	3.26	32	0.57
7	3.26	33	0.13
8	0.98	34	3.26
9	1.49	35	3.26
10	0.50	36	GND
11	GND	37	2.26
12	3.26	38	1.47
13	1.15	39	2.89
14	1.50	40	1.25
15	0.50	41	1.00
16	GND	42	GND
17	3.26	43	1.00
18	GND	44	3.26
19	3.26	45	1.00
20	n.c	46	3.26
21	0.00	47	1.26
22	0.25	48	GND
23	0.00	49	1.27
24	2.40	50	GND
25	2.39	51	0.99
26	GND	52	GND

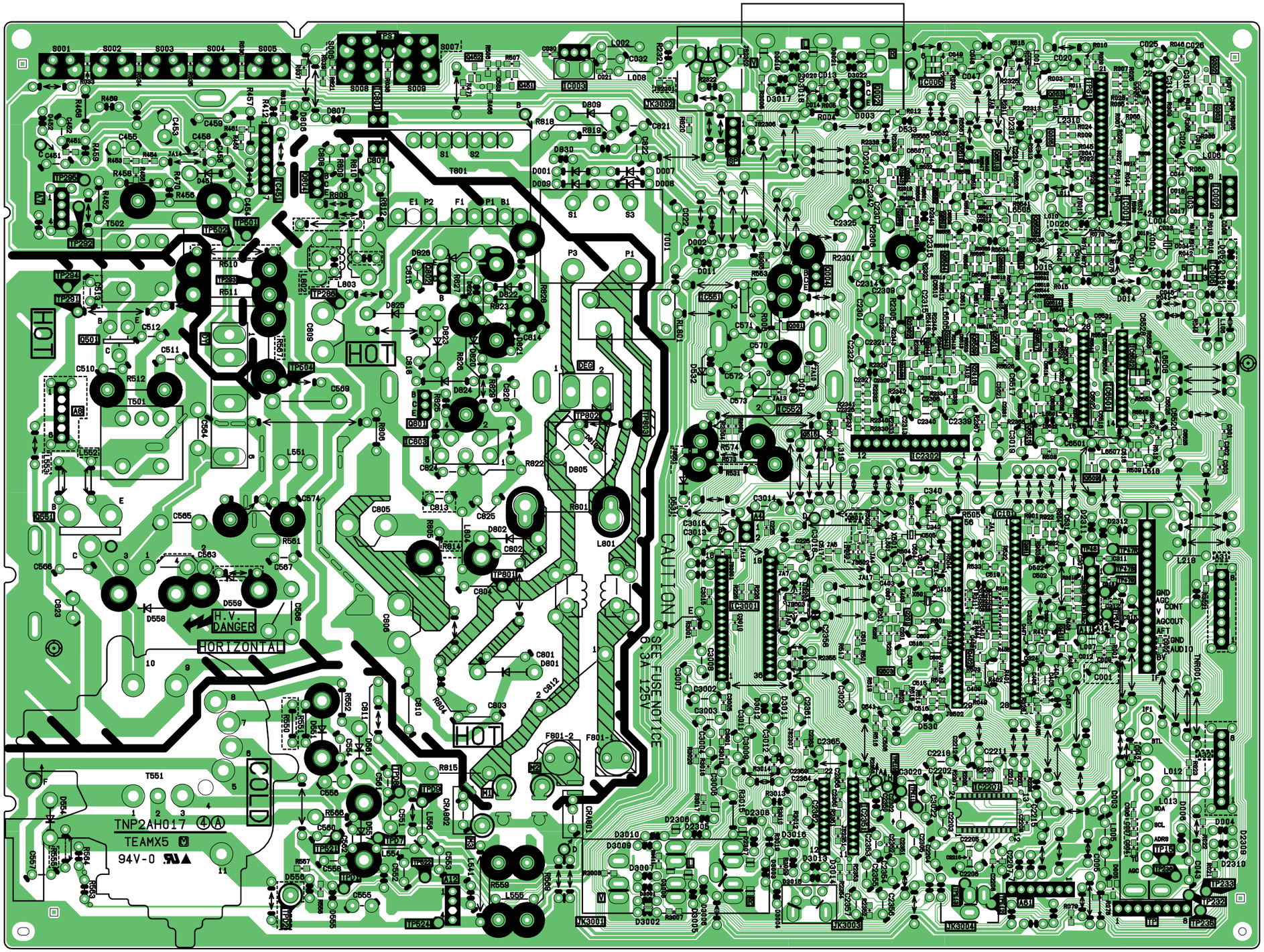
	Q1801	Q1802	Q1803	Q1804
B	0.00	2.95	3.00	1.27
C	3.29	2.40	2.40	GND
E	GND	3.26	3.20	1.93

	Q1805	Q4309	Q4310	Q4311
B	1.00	2.39	2.37	4.74
C	GND	GND	4.72	0.42
E	1.67	3.04	1.73	4.72

	Q4312	Q4313	Q4315
B	0.00	0.63	3.96
C	3.26	0.13	4.72
E	0.57	GND	3.26

A-BOARD -- TARJETA A
ALL MODELS - TODOS LOS MODELOS

A-BOARD LAYOUT -- CIRCUITO IMPRESO TARJETA A



SERVICEMAN MODE (ELECTRONIC CONTROL)
SERVICE ADJUSTMENT VALUES

Model _____ Ser #_____ Date_____

Note: Record the original settings PRIOR to modifying the registers.

Mode	Service Adjustment	Def. Val.	Original Value	New Value
Sub Adjustments				
B0	SUB COLOR	31		
B1	SUB TINT	31		
B2	SUB BRIGHTNESS	31		
B3	SUB CONTRAST	16		
B4	SUB TINT VIDEO	16		
B5	SUB COLOR VIDEO	16		
B6	SUB TINT COMPONENT	63		
B7	SUB COLOR COMPONENT	31		
B8	SUB SHARPNESS TV/VIDEO	20		
B9	SUB SHARPNESS S-VHS/ COMPONENT	31		
BA	SUB CONTRAST (FIXED)	15		
Cut-Off Adjustments				
C0	CUT-OFF R	128		
C1	CUT-OFF G	128		
C2	CUT-OFF B	128		
C3	USER BRIGHTNESS	31		
C4	G DRIVE	64		
C5	B DRIVE	64		
C6	COLOR TEMP DRIVE	8		
C7	COLOR TEMP CONTRAST	5		
C8	CUT-OFF R	128		
C9	CUT-OFF G	119		
CA	CUT-OFF B	129		

Mode	Service Adjustment	Def. Val.	Original Value	New Value
Pin Cushion Adjustments				
D0	H POSITION	16		
D1	V SIZE	31		
D2	V S CORRECTION	4		
D3	V LIN CORRECTION	14		
D4	E/W TRAPEZIUM	8		
D5	V AGC	1		
D6	V POSITION	0		
D7	V CENTERING	63		
D8	V CENTERING DAC SW	0		
D9	V-BLK START PHASE	7		
DA	V-BLK STOP PHASE	14		
MTS Adjustments				
M0	INPUT LEVEL	33		
M1	LOW-LEVEL SEPARATION	6		
M2	HIGH-LEVEL SEPARATION	25		
PIP Adjustments				
P0	PIP COLOR	55		
P1	PIP TINT	54		
P2	PIP BRIGHTNESS	5		
P3	PIP CONTRAST	55		
P4	UP 1/9	26		
P5	DOWN 1/9	143		
P6	LEFT 1/9	10		
P7	RIGHT 1/9	101		
P8	UP 1/16	26		
P9	DOWN 1/16	160		
PA	LEFT 1/16	10		
PB	RIGHT 1/16	116		
PC	PIP FREERUN	0		
PD	PIP Y DELAY	4		

Note: *Some adjustments modes may not be available in some models depending on available options.*

SERVICEMAN MODE (ELECTRONIC CONTROL)
SERVICE ADJUSTMENT VALUES

Model _____ Ser #_____ Date_____

Note: Record the original settings PRIOR to modifying the registers.

Mode	Service Adjustment	Def. Val.	Original Value	New Value
Options Adjustments				
S0	ABL GAIN	3		
S1	ABL POINT	3		
S2	RGB (OSD) BRIGHTNESS	5		
S3	RGB GAMMA	1		
S4	COLOR GAMMA	1		
S5	VSM GAIN	0		
S6	BS POINT	6		
S7	CLOCK ADJUST	128		
S8	LOUD COMP	31		
S9	CAPTION DIG FILTER SW	0		
SA	CAPTION SCROLL	1		
SB	RGB MATRIX	6		
SC	RGB MATRIX COMPONENT	5		

Note: *Some adjustments modes may not be available in some models depending on available options.*

Mode	Service Adjustment	Def. Val.	Original Value	New Value
Comb Filter Adjustments				
X0	CLIP LEVEL	156		
X1	CSOK	12		
X2	COMB LIMIT	24		
X3	COMB CORE	41		
X4	COMB RF DELAY	19		
X5	COMB VIDEO DELAY	18		
X6	COMB VMLM	90		
X7	COMB VMCO	24		
X8	COMB SHARP	123		
X9	COMB VM LEVEL	255		
XA	COMB VMPKF	1		
XB	H LOCK MODE	1		
XC	H LOCK	60		
XD	H SEP1	313		
XE	H SEP2	266		
XF	SUB H LOCK MODE	0		
X10	SUB H LOCK	70		
X11	SUB H SEP1	313		
X12	SUB H SEP2	266		

Printed in USA
K01012221ZR0108

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